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CONTENTS.

ILLUSTRATIONS.

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CONTENTS

BOSTON architects, besides many friends outside the city and the profession, will regret to hear of the death of Mr. Benjamin Franklin Dwight, which occurred last week. Mr. Dwight was born in Boston, and after a short experience in a mercantile house, studied his profession in the office of the late George Snell, and afterwards formed a partnership with the late Arthur Gilman. With him he built a number of city and country houses. After the dissolution of this partnership Mr. Dwight continued in business alone, and designed the Studio Building; several of the large houses on Arlington Street; Selwyn's Theatre and the connecting buildings; and, after the fire of 1873, the Globe Theatre. Of large buildings he also built the Worcester Music-hall, the Gloucester Town-hall, a group of buildings for the Military Asylum at Togus, Maine, Hotel Berkeley, the Hathaway Building and the first of the large wool warehouses on Atlantic Avenue, the Eastern Express building, corner of Washington and Water Streets, the Burnham stores on Washington Street, all in Boston, the Educational Institute at Raritan Bay, one or two churches, and other buildings of more or less importance, and many dwellings. Never a robust man, his health had been seriously impaired of late, though he still continued the practice of his profession. Like his brother, the late John S. Dwight, he was interested in music, and was an accomplished French scholar, speaking the language fluently. He was an active member of the old Boston Art Club, which frequently met in his office; and he aided efficiently in the first of the public exhibitions and receptions of the Club, which were held in what was then known as Allston Hall. He was a man of the kindest disposition, and although his professional life was what would be called a quiet one in these "plan-factory" days, few architects leave more sincere friends behind them at the end of their career.

MR. BENJAMIN C. MILLER, the hero of the extraordinary operation by which an immense hotel was dragged by locomotives to a more favorable site, has recently moved a large brick railway station, on the New York Central Railroad, forty-seven feet to a position on a new alignment of the roadbed. The building is two hundred feet long and forty feet wide, and is said to have been transported without accident. It may, we think, be justly claimed that no work done in this country demonstrates more clearly the fertility of resource and accuracy of observation of the best type of American mechanic, than that performed by the great building-movers. It is easy to say that long practice has made them familiar with the business, but, in fact, the moving of every large building involves new problems, all of which must be met successfully, or the operation will fail, and the contractor will be ruined. To meet the difficulties which continually present themselves, the building-movers use many different devices, and a book recounting the history of the principal enterprises of the kind would be very interesting reading.

WE heard once of a contractor, in a large city which we will not name, who agreed to put in concrete foundations for a building. The method which he employed for carrying out his contract presents so many advantages — for the contractor — that it is worth mentioning. His first step was to fill in the trenches with ordinary gravel. He next opened some barrels of cement, and strewed their contents on the surface of the gravel; and finished his task by playing a stream of water from a hose over the whole, for such time as he thought judicious. What was the fate of the building erected upon these foundations we do not know, but the story is recalled to our mind by the description of an attempt to manufacture concrete *in situ*, by forcing dry cement powder through a tube into a layer of sand, submerged in water. The cement was blown by an air-blast through three holes, each three-eighths of an inch in diameter, in the end of the tube, which was inserted in the sand to be treated. The air-blast loosened the sand, so that the cement was rapidly blown through it, and on the cessation of the operation, the sand settled back into its place. The resistance of the concrete formed in this way does not appear to have been tested, but the particles are said to adhere very firmly together. It is curious that the operation compacts the sand materially. A given volume of submerged sand, after having one-fifth its bulk of cement blown into it, was found to occupy less space than it did originally, and the surface of the concrete piers, after the process was completed, was depressed below that of the surrounding sand.

THE *Builder*, in a review of Mr. W. M. Patton's book on Foundations, makes a remark which we hope will not be taken seriously. It is well known that the *Builder* looks with a rather unfriendly eye upon American ways, and its reviewer discovers many evidences, in American practice in foundation work, of the national endeavor "to cut things fine," or, in more intelligible language, to incur risks for the sake of saving a little money. One of the matters in which the Americans, it thinks, show this disposition, is the choice of cement for foundation work. "The cement used is," it says, "apparently always of German or native production, and is inferior in grade to most English Portland cements"; and it adds that "one reason, and the chief one, why English cement is not more used in the States is that it is of too high a quality to compete in price. If our manufacturers wish to supply the American market, they must fit their goods to the quality that satisfies that market, and they will then be able to make their price both lower and more profitable." We imagine that the unanimous comment of American engineers and architects on this suggestion would be that English cement, although less used in the United States now than it was a few years ago, is still employed to quite as great an extent as much of it deserves to be, and that any English manufacturer who should follow the *Builder's* advice, and attempt to extend his sales in America by reducing the quality of his goods, would find his cement rejected by all respectable architects and engineers.

IT is astonishing, after the endless troubles and discouragements that our architects have been through within the last ten years, in the endeavor to find a brand of English Portland cement in the American market any two barrels of which would have the same properties; which was packed in such a way as not to have a considerable part of each consignment spoiled by dampness; which would set in something like a definite time, if at all; which was so thoroughly and evenly ground that a specified and maximum proportion of sand could be used with it; and which could be depended upon not to swell after setting, and burst the masonry laid with it, to find a high authority explaining to its English readers that the feeling of uncertainty which the name of English Portland cement excited in American architects and engineers was due to its superior quality, and consequent high price, and that the best way to overcome this prejudice was to reduce the quality. The *Builder* ought to know that the brands of German Portland

cement used in the United States cost more than any of the English brands commonly found here, and the obvious reason why they have been pushing the English cements out of this market is that our engineers and architects, finding them, as a rule, more uniform than the English cements, have compelled their use, against the resistance of contractors, who have clung long and fiercely to the cheaper English brands. That the competition of the American Portland cements, which are rapidly improving in quality, affects the importations from England is, undoubtedly, true; but the way to meet this competition, as, in general, to retain a sure hold on the American market for anything, is to provide the best goods that can be made, — not the worst.

THE coroner's jury in the case of the accident at the Chester Bridge, on the Boston & Albany Railroad has brought in a verdict, fixing the immediate responsibility for the accident on the foreman in charge of the affairs on the bridge, but holding the railroad company ultimately responsible. This verdict accords with the judgment of the State Railroad Commissioners, who considered the bridge-repairers in fault for the carelessness which led to the disaster, but held that the railroad company was also negligent in allowing trains to be run at full speed over a bridge, already of doubtful strength, in process of repair, and in allowing such repairs to be carried on without deputing some one to see that its trains were not endangered. It is due to the railroad company to remark that its reputation for care of its passengers is very good, and this is said to have been the first accident to passengers on one of its trains for which it was held accountable; but it is not so pleasant to learn that the company is reported to have utilized its rather flimsy pretext for avoiding responsibility as a means for making favorable settlements with some of the injured parties. The story is, for example, that the widow of one of the men who was killed by the accident was persuaded to accept five hundred dollars in full satisfaction of her claim by the argument that the railroad company was not bound to pay anything, and that she had better take that than nothing. Supposing this story to be true, which we hope is not the case, it would be interesting to know whether such a settlement would be legally binding. If the railroad company had been directly in fault, and had only pretended not to be in order to defraud a person having a just claim upon it, there is no doubt that the receipt in full would be set aside, and that the claimant could recover adequate damages, notwithstanding the receipt; but, at the time of the settlement, there might be said to have been a reasonable doubt of the legal responsibility of the company, and a lawyer might argue that the claimant and the company had this in mind at the time of the settlement, which was, therefore, made in good faith, and was conclusive on both parties. What view a court would take of the question will probably never be known, as the claimants are presumably too poor, even if they exist, to press the case, but it might form a curious topic for discussion in law-school courts. Meanwhile, the more prudent among the injured people have waited until the responsibility was fixed on the company, and have commenced suits for damages to an amount which will probably diminish materially the surplus in the company's treasury.

LA SEMAINE DES CONSTRUCTEURS has something to say about the massacre of Italian by French workmen at Aigues-Mortes, which has a certain interest, from its similarity to the talk of politicians here. After speaking in a rather slighting manner of the "rows" at Aigues-Mortes, it says that they must be attributed to the fact that French workmen are, relatively to the Italians, well educated, and have their intelligence and sentiment, "in one word, their faculty of enjoyment," more developed, and that, in consequence of this, they need higher wages than Italians and Belgians, "generally habituated from infancy to filthy surroundings, and to food consisting of macaroni or rye-bread, and almost totally devoid of even elementary instruction"; the result of which is that, on seeing their employment taken away from them by foreigners, who can afford to work cheaper than they wish to, they utter protests, somewhat "brutally expressed." It would seem to the ordinary mind as if the French workmen's "superior intelligence" and greater instruction had not done him much good if they had not made him more valuable to his employer than a "filthy," macaroni-eating Italian, but French officials do not reason in that way, and an ordinance has already been introduced in the Municipal Council of Paris, and a similar one in the General Council of the Department of Meurthe-et-Moselle, prohibiting contractors for public work, under penalty, from employing more than one foreigner to every five French citizens. It does not appear that the ordinance has, in either case, been adopted, possibly because some one has pointed out that a great many Frenchmen are employed in foreign countries, and that reprisals in kind by the governments of these countries, in reply to discrimination against their subjects, might have unpleasant consequences; but the temper of the country seems to favor some sort of "protection of labor," and we shall probably see some instructive experiments tried.

THE German technical papers are remarkable for the practical receipts which they contain; not that our own journals do not contain practical receipts, but because those in the German papers, instead of being copied from ancient receipt-books or concocted at random, usually bear the name of some well-known scientific man, and are based on reasoning as well as experience. One of these receipts, by Herr K. Keyfar, is copied in the *Bautechnische Zeitschrift*, and is worth remembering by architects, as well as by steam-fitters and plumbers. As is well known, the cement used for making tight the joints of steam-pipes and other ironwork exposed to heat and pressure is a pinkish putty, now commonly made with a mixture of white and red lead, although it is not long since pure red lead was supposed to be the only proper material. This lead-putty is, however, according to Herr Feyfar, often carelessly and ignorantly made, so that it fails, sometimes to a dangerous extent, to do what is required of it. Properly, the cement for putting together steam-pipes should be made with equal parts of pure red and white lead, thoroughly mixed and well kneaded with pure linseed oil, which has been rendered drying by boiling with ten per cent of red lead. Workmen in steam-fitting shops do not know much about the properties of oils, and often mix their putty with raw linseed oil or grease, or even kerosene. It is hardly necessary to say that coal-oil is soon volatilized by the heat, leaving the white and red lead in the form of powder. Grease is not much better, and raw linseed oil hardens slowly, and should not be employed. Where the materials are suitable the putty sets quickly, and becomes so hard that it can with difficulty be cut with a chisel. The mixture of red and white lead has certain advantages over either separately, which should be understood. Red lead alone gives a hard and quick-setting cement, but the red-lead putty is not very plastic, and does not cling well to the surfaces of the iron. White lead alone makes a plastic and adherent putty, but while red lead gives up a part of its oxygen to the oil, so that a red-lead putty hardens all through, white lead does not yield oxygen, and a mass of white-lead putty hardens only on the surface, remaining for a long time soft in the interior. A mixture of the two substances combines the advantages of both. In kneading the putty, care should be taken not to allow iron filings or bits of dust to get into it. Where the joint is not to be exposed to heat, chalk may be added to the putty in quantities equal to that of the white lead. If the drying must be hastened, a little brown oxide of manganese, very finely ground, will help it. For hot joints, finely-ground graphite, in quantity equal to the white lead, may be added, but the graphite cement does not set so quickly as the lead alone. The surfaces to be joined should be even, as left by the turning-lathe or planer, but the putty will not stick well to a polished surface. Where the putty alone must support a severe pressure, as in the case of a flange-joint in a steam-pipe, it is best to strengthen it by inserting in the joint a piece of paper or felt, covered with putty on both sides, and if the joints are very rough, as in the case of flanges which have not been turned or planed, it may be best to mix some threads of hemp or flax with the putty, but care should be taken not to use too much. Where the joint is exposed to great heat, no combustible substance, such as flax or hemp, is suitable, and the best way is to cut out a piece of wire gauze, spread it thickly over with putty, and lay in the joint. It is sometimes necessary to make steam-tight joints in such a manner that they can be readily taken apart and replaced, as in the case of the man-hole of a boiler or the head of a cylinder. For making these joints the lead-putty is unsuitable, as it becomes too hard to be easily removed, and it is best to employ felt or soft paper, soaked with boiled linseed oil. If possible, sheets of such paper should be previously prepared by soaking with the oil and drying, and, when used, they should be cut to the proper shape, covered on both sides with boiled oil and laid in the joint.

THE BURGUNDIAN SCHOOL OF ARCHITECTURE.[1] — I.

DURING the Mediæval and Renaissance periods Burgundy was one of the most important artistic centres of France, and its influence in the development of architecture and sculpture extended far beyond the limits of the province; it may be seen asserting itself even in the Cathedral of Langres (Haute-Marne), in Switzerland in the Cathedral of Lausanne, in Ile-de-France in the Castle of Saint-Germain-en-Laye, where the chapel is based on the Burgundian constructional system of the thirteenth century, and lastly in a large number of edifices in Bourbonnais, Lyonnais and in the north-east.

In religious monuments, this school at first adopted the longitudinal barrel-vault for covering the lofty naves, which it attempted to buttress with groined vaults over the square bays of the side-aisles; as for instance, in Notre-Dame at Beaune (Fig. 1), one of the largest churches of the region; but this system which might have been applied, if absolutely required, to edifices of restricted dimensions, was not feasible for naves of such vast proportions, which, moreover, the builder essayed to light in the upper part by means of openings above the roofs of the side-aisles: this disposition necessitated carrying the walls up to a great height, and, of course, caused a tendency in them to bulge under the pressure of poorly buttressed barrel-vaults.

But, under the influence of the powerful school of Cluny, Burgundian architects were not slow in recognizing the defects in the course adopted, and we find them making persistent efforts at recovery, which soon produced a remarkable result, the bearing of which on the general architectural progress of the thirteenth century was moreover destined to be considerable. Thus, in the porch of the beautiful Church of Vézelay we see in the twelfth century an application of this new system of construction to the lofty vaults; they are established on a rectangular plan and the thrusts are borne, more or less skilfully it is true, on the piers and buttresses (Figs. 2, 3). These vaults are themselves very remarkable in this respect: while exhibiting the ribbed disposition they do not reproduce the antique vaults based on the intersection of cylinders, but follow a peculiar trace designed to make them less bulging, diminish the thrust and facilitate their construction without a preliminary diagram; here we see for the first time diagonal ribs developed in a semicircle, a principle which Gothic builders adopted from the close of the twelfth century in the conception of the vaulting that forms the basis of their entire system and that has admitted of most varied and wonderful applications.

Independently of this progress in the general conception of religious edifices, Burgundy, which had at first been subjected to Gallo-Roman influence, was not long in giving an original stamp to its artistic productions, as will appear from an examination of the trace of the piers and arches of the old part of the church of Notre-Dame at Beaune and of the porch of Vézelay; the proportion of these robust orders is excellent and the details are strong and skilfully treated. The ornamental sculpture and the statuary furnish us likewise proof of the remarkable aptness of the artists of the province. The porch of the Cathedral of Autun, and more especially that of Vézelay, are masterpieces of composition and are besides admirably executed in certain parts. Though Byzantine influence makes itself felt at the point of departure, at every step in these works an interpretation of nature, which was much studied, is observable, as well as a sentiment quite strikingly distinctive.

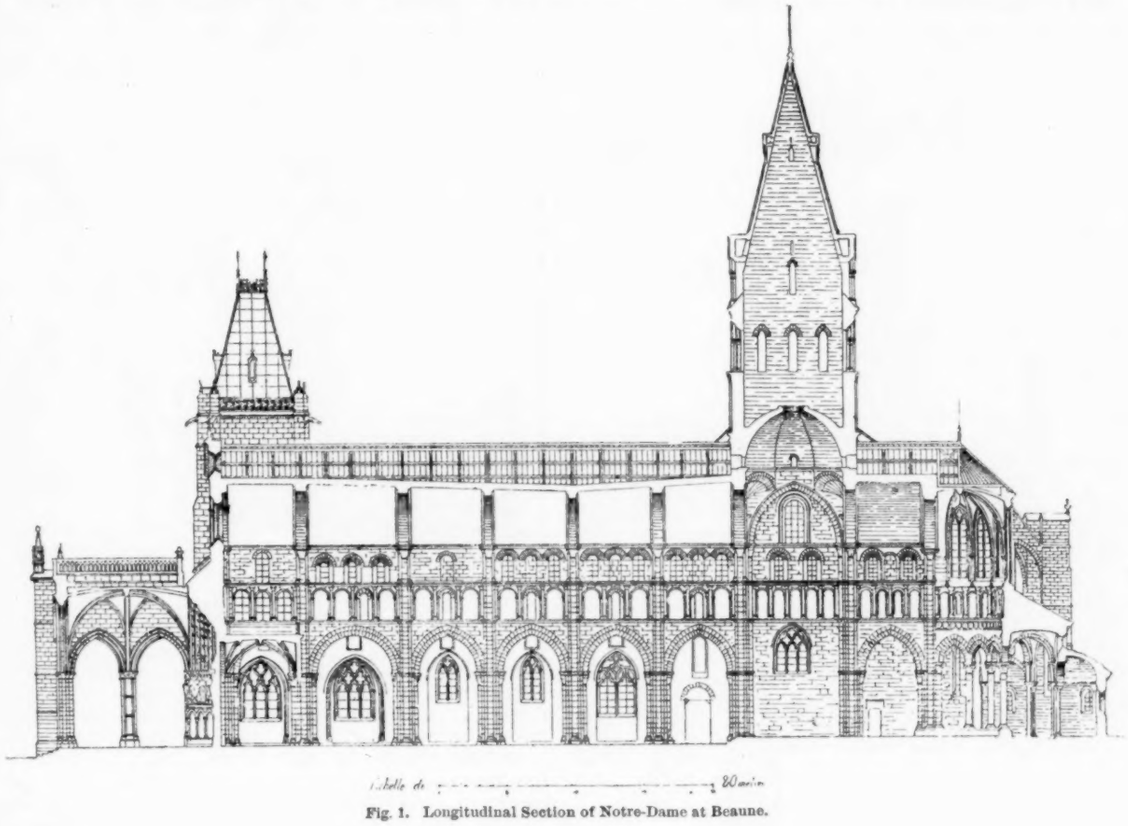


Fig. 1. Longitudinal Section of Notre-Dame at Beaune.

It is important, before passing to a discussion of the Burgundian architecture of the thirteenth century, to follow carefully the development from this centre during the Romanesque period, in the domain of sculpture as well as architecture, for it is quite obvious that the special character manifested by this school in Gothic times is due to earlier efforts, as it is, also, a consequence of the use of peculiar materials. The use of antique tiles, which prevailed for a long time, naturally gave an individual aspect to these edifices, on account of the slight slopes, particularly above the side-aisles, since there resulted a special disposition in transverse section.

On the other hand, the dimensions and the peculiar resistance of the Burgundian limestone furnished the province with exceptional elements, which, moreover, its constructors were able to utilize with extraordinary skill, as is proved by all of

[1] From the French of A. de Baudot, in Planat's *Encyclopédie de l'Architecture et de la Construction.*

the thirteenth-century edifices, and especially by Notre-Dame of Dijon. If, for example, the plan of the porch (Fig. 4) is examined, one will be struck by the slenderness of the piers, which are built of large stones and surrounded with columns, cut contrary to the cleaving grain and introduced with surprising art that savors in no way of audacity, but which is the outgrowth of experience acquired in the development of an order of ideas rational if not scientific. The same order of ideas is likewise maintained throughout the conception of the construction, and the monument, therefore, exhibits qualities of harmony not often existing to the same degree (See sections and apse, Figs. 5, 6, 7). But worthy of especial attention is the arrangement of the bays of the nave; in these, the lightness due to the use of the materials furnished a unique solution, of which an accurate idea may be obtained from the perspective view and the section. In examining the section, the student will notice the ingenious means adopted in loading by the upper dispositions, the slender, isolated piers of the nave, and in conditions such that the vertical pressure strengthens the piers. In the management of the upper galleries, we detect an effort to reduce to a minimum the material employed, with a view to economy, and at the same time with the intention of rendering expressive, from an artistic standpoint, this disposition, which, in principle, derives its *raison d'être* from the constructional system; in such a process the architectonic sense could not be overlooked; hence the pregnant source of instruction afforded by these conceptions, which admit of the most rigid analysis, and therefore offer a compositional method which is capable of wide application. On the other hand, these solutions suggest the way in which it is possible in the general dispositions so to reduce the points of lower support as to facilitate circulation and harmonize structure and form; that is to say, answer at the same time both rational and artistic demands. Particularly will one remark, in this respect, the system of ceiling adopted between the formeret arches of the vaulting and the external walls, and intended to aid in the introduction of light; it is also a result of the constructional system.

Fig. 2. Transverse Section of the Porch of the Church of Vézelay.

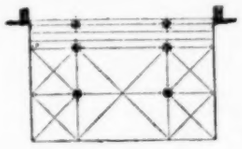


Fig. 4. Plan of the Porch of Notre-Dame at Dijon.

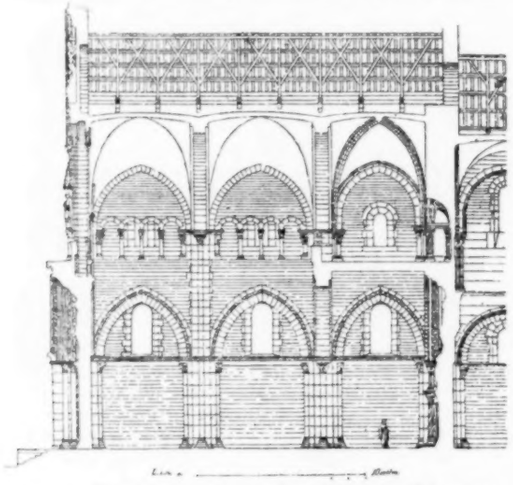


Fig. 3. Longitudinal Section of the Porch of the Church of Vézelay.

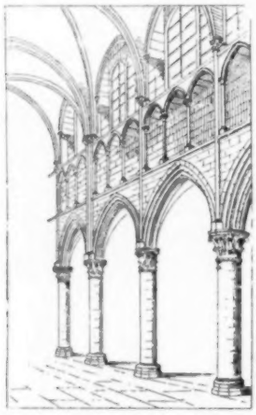


Fig. 5. Nave of Notre-Dame at Dijon.

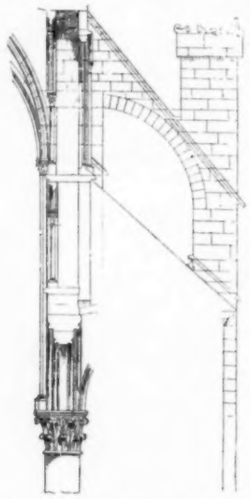


Fig. 6. Transverse Section of Notre-Dame at Dijon.

Before quitting this interesting edifice, we must call the reader's attention to the arrangement of the buttresses and flying-buttresses, the details of which may be studied in the transverse section. For motives that cannot be indicated here, and which are, moreover, of little importance, the builder was led to reduce the projection, in comparison with what is usually done in such cases, and, consequently, the section of the external buttresses as well; and yet he was obliged to look to these piers to support the thrust of the lofty vaulting. At the outset, the architect, taking advantage of the system of corbelling which enabled him to provide for a buttress above the roof over the side-aisle by placing a lintel in the upper part, established at the point of the thrust of the vault a powerful shouldering wall-piece, and thus supported a part of the action to begin with; then skilfully, by means of a very reasonable mode of laying the stones, weighting the buttressing pier with a lofty pinnacle, he assured the equilibrium of the whole.

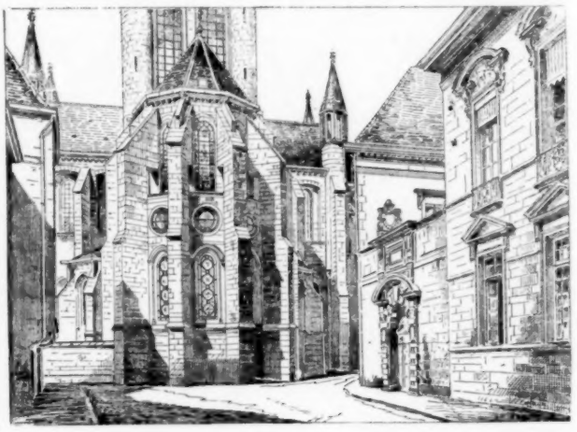


Fig. 7. Apse of Notre-Dame at Dijon.

[To be continued.]

Accident to a Picture by Burne-Jones. — The news that Mr. Burne-Jones's well-known picture "Love among Ruins" has been completely destroyed past all hope of reparation will seem to many people to whom English art is dear little short of a national calamity. The picture was entrusted by Mr. Burne-Jones to a well-known firm of art publishers, at their urgent request, for the purpose of reproduction by process, and not only did the publishers know that the picture was a water-color, but Mr. Burne-Jones had even taken the precaution to affix a label on the back of the work stating its medium and that any moisture would be injurious thereto. In spite of this the picture was apparently confided to some ignorant employé, who covered the whole surface with a preparation of white of egg. The result is the destruction of all the final touches and finished tones. The faces and hands are smeared and blurred, and, in fact, one of the records of the life of one of the greatest painters of this or any century is practically wiped off the roll of fame. When one remembers the crowds that collected before "Love among Ruins" on each occasion of its being exhibited to the public, one gets some faint inkling of the indignation and dismay which the news of its destruction through carelessness has spread broadcast among all lovers of art. — *Edward Yates in the New York Tribune.*

OFFICE-HELP FOR ARCHITECTS.[1]—XX.

Fig. 92.

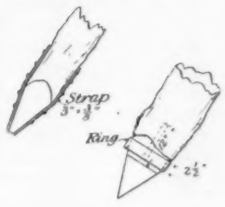


Fig. 93.

SECTION IV.—SUBSTRUCTURE:

§ 269. Materials: — Piles, sheet-piles, timber-cribs, sand or gravel fills, sand piles.

§ 270. Piles: — Wherever buildings or other structures rest on a compressible soil, and where the soil is not homogeneous, and the conditions permit, piles make the best of all substructures.

Materials: — May be of oak, spruce, hemlock, cedar, yellow pine, palmetto, cast-iron, wrought-iron or steel.

Classes: — (*a*) Those which, passing through a soft homogeneous material, bear on gravel, rock, or are deeply bedded in sand, and which may be considered as columns. (See Chapter III, "Columns.")

(*b*) Those which pass through a non-homogeneous material, and which must be considered as resisting the weights by skin friction, to be on the safe side. (See Table XXIX.)

Preservation: — All wooden piles must be cut off below the lowest point at which the water in the soil is known to stand. An exposure of three or four weeks to the air after being saturated, will almost surely set up rot and result in the ultimate destruction of the pile.

Piles exposed to sea-water must be thoroughly impregnated with creosote, dead oil of coal-tar or some mineral poison, to protect them from the "teredo," a worm which will bore through an ordinary pile in three or four years, completely honey-combing it.

Metallic piles should be of cast-iron and asphaltum coated in the best manner.

§ 271. Wood Piles: *Driving:* — See that all piles are practically straight and sound. Cut the butts off square, chamfering the edge slightly. Trim off all knots and branches smoothly with an axe. Point with an axe making the point about 12″ long, and about 2″ square in the end (Fig. 92).

Whenever the penetration is less than 4″ under the blow of a 1,200 pounds hammer, falling 15′ 0″, secure the head against brooming by putting on a ring 2½″ wide, ⅝″ thick, and 1″ less in diameter than the least diameter of the head of the pile.

When driving into compact gravel or rotten rock, protect the point with a wrought-iron strap 2″ wide, 48″ long, spiked to the point with five spikes, or else cut the point off square, bore a 1¼″ hole in the end, and fit in a cast-steel shoe with a dowel end 12″ long and secure the point against splitting by using a 3″ x ½″ ring (Fig. 93).

The proper length should be determined generally by test bores or by test piles, but the driving should be carefully watched all the time to determine the proper depths, as in non-homogeneous ground there will be a considerable range.

In supervising pile driving, observe the following points:

(*a*) Keep the pile plumb.

(*b*) When the penetration is small, and the piles spring under the hammer, drive with a small fall (5′) and quick blows.

(*c*) When driving into gravel, drive one pile as far as possible, or until the head begins to broom badly, noting each penetration.

If penetration is uniformly decreasing, for from 6′ to 10′, drive the succeeding piles only 2′ or 3′ into the gravel. If the penetration is irregular, and begins to increase just before you stop, or if the succeeding piles show much change in penetration, sink a test bore down at least 10′ below the point of pile, as probably you are near the bottom of the stratum, and may be over a soft one.

(*d*) If the stratum is 6′ or more in depth, stop the driving as soon as a penetration of 2′ into the stratum is had. If less than 6′ drive through it, unless it is below the depth given in the piling table, and proportion the weight accordingly.

(*e*) Whenever a pile "brings up" (acts as though it had reached rock) before it reaches the average depth, try it with several light blows, and if it still refuses to move, cut it off, and drive another pile beside it.

(*f*) In driving into sand, use a duplex pump 6″ x 4″ x 6″, with 2″ suction, and 1½″ discharge; connect discharge end with a 1¼″ pipe of length = pile length + 5′, through 1½″ hose, of length equal pipe length + whatever is necessary to reach one dozen or more piles without moving pump, by means of one reducer and one quarter-bend.

Start pump, and place pipe beside pile, with hammer resting on pile, but with the fall almost taut, and pile will descend under weight of hammer or under light taps very readily. One machine should easily drive 100 piles per day if spacing does not exceed 3′ 0″, *c* to *c*.

Length of pile should be such as to carry point 10′ 0″ below the lowest point that disturbance is likely to reach. Bearing value of pile may then be computed as a column 10′ less in length than the pile.

It will be found nearly impossible to drive a pile deeper four hours after the water-jet has been withdrawn, except the jet be used again.

(*g*) Fix the cutting-off point so that the pile will always be immersed in water.

(*h*) Piles exposed to tidal waters must be charred and impregnated with creosote or dead oil of coal-tar, say 12 pounds per cubic foot. Palmetto timber is said to resist the teredo without treatment.

(*i*) It is immaterial whether the fall is automatically loosened from the hammer or not.

Cutting: — When spaced 3′ 0″, *c* to *c*, or less, piles should be so cut as to leave the heads smooth, sound and so near level

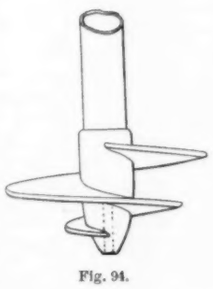


Fig. 94.

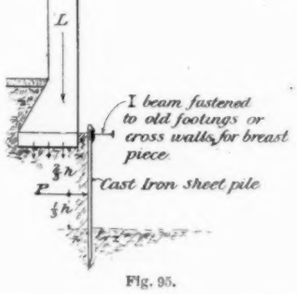


Fig. 95.

that of a dozen heads examined, no one or part of one shall be at a greater distance than 1″ from a plane passed through all at their average height.

No rough edges, chips or vertical inequalities should be permitted. When spaced more than 3′ 0″, *c* to *c*, the pile-heads

[1] By George Hill, Consulting Engineer. Continued from No. 928, page 7.

ABBREVIATIONS AND SYMBOLS.

= equal to.
∥ parallel to.
÷ divided by.
× multiplied by.
+ added to.
a^2 *a* multiplied by itself.
$a > b$: — *a* greater than *b*.
$a < b$: — *a* less than *b*.
$\frac{a}{b}$: — *a* divided by *b*.
∴ therefore.
□′ square feet.
□″ square inches.
8ᴸ read 8 pounds per lineal foot.
C channel bar.
I I-beam.
T T-iron.
L angle iron.
deck beam.
round section.

I ton = 2,000 pounds as this is the conventional ton, the legal ton is 2,240 pounds, but is rarely used.
l = the length between supports of any beam or girder or height of any column, always in feet.
b = breadth of any beam or girder, always in inches.
d = depth of any beam or girder, or the least transverse dimension of any column, always in inches.
L = total load uniformly distributed coming on any piece in pounds.
L^{pf} = " " " " per square foot in pounds.
W = concentrated load on any piece in pounds.
s = span of any arch or truss between centres of end pins in feet, or spread of footing courses.
A = area of any section in square inches.
M = maximum bending-moment in inch pounds.
a = distance of centre of gravity of section from either top or bottom edge in inches.
I = moment of inertia, neutral axis through centre of gravity.
R = moment of resistance of section.
r = radius of gyration, in inches.
Sc = safe compressive strain in pounds per square inch.
St = " tensile " " " " " " "
Ss = " shearing " " " " " " "
S = strain per square inch in extreme fibre.
P_e = upward reaction of support at left-hand end of beam.
P_f = " " " " " right " " " "
e = distance of centre of gravity of load from left hand of beam.
f = " " " " " " " " right " " "

should be cut off absolutely plane, and so nearly level that no pile should be more than $\frac{1}{4}''$ above or below its neighbor on both sides, or $\frac{1}{4}''$ away from the predetermined level.

Finishing: — When piles are spaced more than 3′ 0″, *c* to *c*, finish with a timber crib as described later, fastening the crib to the pile with oak treenails 3′ 6″ long, roughly $1\frac{1}{2}''$ square,

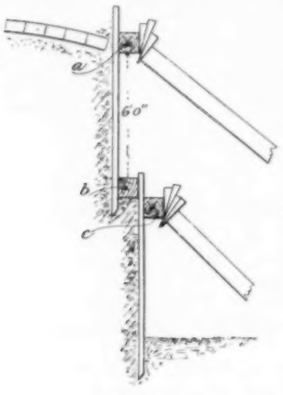


Fig. 96.

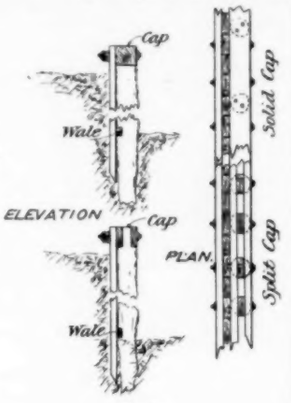


Fig. 97.

and driven into a hole $1\frac{1}{4}''$ diameter. When spaced 3′ 0″, *c* to *c*, or less, thoroughly clean away all chips, etc., and excavate to a depth of 8″ below the pile-heads, then fill-in to level of heads with two courses of concrete, well rammed, then cover with 18″ of concrete; then start footings.

Spacing: — 12″ piles may be spaced a minimum of 18″, *c* to *c*, but better results are had when the spacing is wider. Piles should generally be spaced in pairs.

Loading: — Examples exist of piles having carried 80 tons without settlement, but the writer would strongly advise against loads exceeding those given in the tables, unless it is impossible to do otherwise, and then the best of engineering advice should be sought.

For any spacing or arrangement, make a layout for six, eight or ten feet, and divide the number of piles obtained by the number of feet run, counting the $\frac{1}{2}$ piles at beginning and ending of space.

§ 272. Metal Piles: *Classes:* — (*a*) Screw-piles. (*b*) Disc-piles. (*c*) Cylindrical piles. (*d*) Sheet-piles.

Uses: — Usually employed where a portion of the piles must be exposed to severe transverse strains, as in ocean piers, light-houses on shoals, sinking pits beside and below foundations that it is undesirable to shore and underpin.

Used also as securing longer life than wood piles under conditions unfavorable to wood.

§ 273. Screw-piles: *Driving:* — Screw-piles should be helical with the width of the blade a maximum for one full turn, and then rapidly diminishing into shank and point (Fig. 94); screw usually made of cast-iron, with either a threaded or bolt connection to the pile proper. If threaded, the threads should be keyed so that the pile can be withdrawn. Should only be driven through material measurably free from logs, stones, etc. In driving, build a trestle with provision made for holding the pile during driving, and a working-platform; the pile is then put into position, made truly vertical, a wrench put on, or the pipe grasped with pipe-tongs and screwed down by the men walking around. As the pile goes down, the wrench or tongs are shifted up until the pile is in position. The sinking is very much facilitated by the use of a tightly-fitting cap on the pile-head, to which a $1\frac{1}{2}''$ pipe is connected from the delivery end of a pump, the water that is forced in being discharged through an orifice in the point of the pile. Should the pile cant, or show a tendency that way, it can generally be corrected by the use of a water-jet similar to that described for a wooden pile — first on the side that seems to have the most resistance, and then all around the pile.

Often a disc on the end of a pile can be put down by means of the jet as readily as the screw-pile, but then two jets should be used. In setting screw-piles, they can generally be brought to exact grade, but disc-piles cannot without an expenditure of labor greater than that involved in cutting them off.

§ 274. Cylindrical-Piles: — Should be driven in manner similar to wooden piles, the head being protected with a cap, for sizes up to 15″. Beyond this size they are seldom advisable; should be driven with a hammer very slowly, and the material inside kept within 1″ of the bottom by using a sand-pump of large dimensions. A jet kept working around during the driving will greatly facilitate it. Cylindrical-piles of 2′, 3′, 4′ or more in diameter are often used in pairs, and for pier and bridge foundations in very soft material, and often give excellent results. They are also used in very much greater sizes than the above singly. The material removed from the inside is usually much in excess of the volume occupied by the pile, and, must be carefully guarded when used near a building.

Cutting: — Any one of the several pipe-cutters in the market can be used for this purpose, but care should be taken to make the cut perpendicular to the axis of the pile. If the pile is slightly out of plumb it can be brought back.

A pile that is not perpendicular when it is in proper position, unless meant to batter, should be drawn and redriven.

Finishing: — When the piles are in place, a screw-cap should be put on, or a plate and angle cap rivetted on with lugs for bolting beams, girders and sway-bracing to. The inside of the pile should be filled with rich cement-concrete, deposited in such a manner as to prevent the contained water from washing the cement away from the sand and broken stone. The cement filling should be thoroughly rammed, when it will adhere tightly to the uncoated iron inside, and probably prevent rust. The outer surface should be painted as soon as the pipe leaves the shop with three coats of linseed oil and red lead paint (Chapter XI, Section VI), and should be painted again, so far as possible, just before the works are completed.

Spacing: — Will usually be determined by the required size of the flanges and the requirements of the works. Usually, the wider apart they can be placed the better up to a point when the spacing of the piles in a bent equals distance from extreme high water to bottom of water, or equals length of end from soil to cap.

Whenever a pile whose length from soil to cap exceeds ten diameters is likely to be subjected to shocks such as drift-wood, logs, floating ice or wave-action, it should be braced strongly with diagonal bracing to the piles nearest it, and the bracing raised sufficiently to be clear of all obstructions.

The disc should be made of cast-iron. The shaft should be of steel or wrought-iron.

Loading: — Safe bearing-value of screw and disc piles when the screw or disc goes at least 10′ below the lowest point of scour in the water, or the same depth below the surface of the ground elsewhere, may be taken at double that given in Table XXIX, provided the pile is in sand or the load is very slowly applied and the disc should be so proportioned

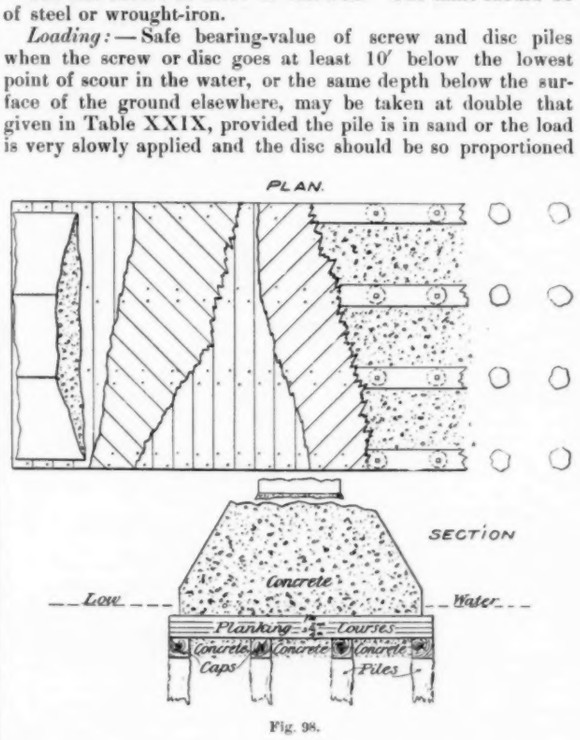


Fig. 98.

that its bearing surface equals the area of a circle whose diameter is the maximum diameter of the disc. The depth should be such that there will always be at least 10′ of undisturbed material above the disc. The cylindrical part of all piles should be computed as a column of length = free length

of pile (See Chapter IV), and in addition, provision made to resist any transverse strains, should that be necessary.

§ 275. Metal Sheet-Piles: — Should be driven with a light pile-driving hammer, a heavy sledge or a "tup," with the heads protected. Sheet-piles should be of cast-iron proportioned to resist the moment of the earth thrust as per Formula 54, § 258.

If near the footings of a building, add to this moment that due to a uniformly distributed load over the free height $= \frac{1}{4}$ load of wall of building and floors, and proportion as cast-iron lintel, § 197, Chapter III, Table VIII.

Sheet-piles should be secured at top by bolting to an I-beam or by slipping an I-beam into heads formed to receive it, and at the foot should be similarly secured against coming in, by using an I-beam properly braced (Fig. 95).

The load on the I-beam breast-pieces will be the reaction from the sheet-piles. (See § 258).

§ 276. Wooden Sheet-Piles: *Use:* — Generally of a temporary character although sometimes meant to be permanent. Permanent uses have been indicated. Temporary uses are principally to exclude the earth from an excavation when from any reason it is impracticable to let it take a natural slope. Occasionally two courses of sheet-piles two or more feet apart are driven, and the space between filled with a clay puddle to make a coffer-dam. Make either of plain plank, tongued-and-grooved plank or of three planks with the centre one advanced beyond the others, forming a tongue on one side and a groove on the other and known as the Wakefield sheet-pile.

Use tongue-and-groove sheet-piles when a moderate amount of water is to be excluded and the Wakefield when it is desired to have the sheeting as tight as possible.

Driving: — For whatever purpose, the penetration of the pile usually fixes the general method.

If to hold moderately firm or dry earth back during excavation when plenty of room is available, or when the depth exceeds 10′ 0″ then the piles should be used of length sufficient to reach to $\frac{1}{2}$ the depth or in 12′ 0″ lengths. The breast-piece *a* (Fig. 96), is put in and braced in position, the sheet-piles are given a sloping chisel point and driven with a "tup" or "maul" or a light frame hung from the end of the boom of a boom derrick ("*Engineering Record*" Vol. 25, Page 281). As fast as the pile penetrates, the earth is removed until the pile shows signs of coming in, then the breast-piece is put in, braced, and worked down until the excavation reaches a point 2′ 0″ above the point of the piles.

Then a new breast-piece *c* is put in and braced, and the distance between *b* and *c* secured by means of wedges which are knocked out as the piles are driven. The driving of the lower course is similar to that of the first, the men who do the driving passing along, driving each pile down a little at a time, and keeping them nearly uniform in depth. If desired the breast-piece *b* can be omitted, *a* being wedged off the proper distance with wedges behind each sheet-pile.

Piles should be 2″ × 10″ hemlock or spruce, straight grained and sound, and should have a breast-piece for each six feet of height in the clear, that is, the maximum distance on centres between *a* and *b* or *b* and *c* should be 6′ 0″. Breast-piece should be 10″ × 10″ with a brace each 8′ 0″ of length.

To hold soft earth, mud or silt, they should go an increasingly greater distance down as the material gets softer, up to about 10′ 0″ below the bottom of the pit. This depth should be attained before the excavation is started, and when started, it should be so prosecuted as to expose only a small portion at a time, say 200 square feet, which should be immediately partially loaded, otherwise the pressure on outside may cause the material to flow in.

Driving is much facilitated in sand, clay or gravel by the use of the water-jet,

An 800-pound driver can also often be used to advantage when the piles are meant to be permanent, but then creosoted North Carolina pine or Canadian spruce should be used, and the breast-pieces are made lighter, are secured to round piles and are called wales (Fig. 97).

The piles should be so placed as to be brought against the cap and lower wale by the outside pressure. Cap is 10″ × 10″ or 12″ × 12″, or 3″ × 10″, or 4″ × 12″ in pairs, held to pile by means of oak tree-nails roughly squared $1\frac{1}{2}$″ × 30″ long, and driven into a $1\frac{1}{4}$″ round hole 30″ deep, or the head of the pile is notched 3″ or 4″ on each side, leaving a tenon at least 6″ thick and the cap put on in pairs and bolted through each pile head with 1″ bolts, using 4″ washers.

After the piles are driven, the outer wale is put on and bolted through the caps with $\frac{3}{4}$″ iron bolts and 4″ washers, bolts spaced 3′ 0″, *c* to *c*, and yellow-pine shims put between the two parts of the cap.

Often it will be necessary to put in temporary struts until the footings are up and back filled to prevent the sheet-pile from being pushed into the pit.

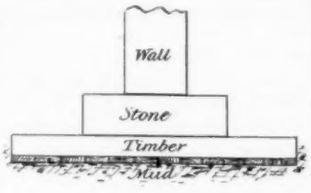


Fig. 99.

Finishing: — If the sheet-piles are to be left, the top edge should be cut true with a saw and a plank cover 2″ thick, and full width of piles, cap and wale, spiked on to exclude rain as far as possible.

The works should never be painted.

Loading: — The moment effect of pressure on the piles, when desired, can be obtained by Formula 55 and the piles proportioned to resist it to by using the formula of Chapter III.

Drawing: — Use a pair of claws with a chain passing through the eyes, and the ends connected in a ring in which a lever is inserted, or a simple heavy chain with two rings.

§ 277. Cribs: *Material:* — When of metal, see § 267. When of wood, which is the usual material, use yellow pine or spruce, treated.

Methods: Over-piling: — After the piles are cut, cap with 12″ × 12″ timber, placed longitudinally and tree-nailed to piles, then fill space between caps with concrete to level of caps. When the caps are 4′ 0″, *c* to *c*, or less, connect all caps with four courses of 2″ × 12″, two courses making an angle of 45° with the caps and two courses at right angles to them. Each course spiked at each intersection and at the ends with 5″ boat spikes. Above 4′ 0″, for each added two feet of distance, *c* to *c*, add one inch to the thickness of the courses. The footings courses should come to within 1′ 0″ of the outer edge of the outer row of piling in every case (Fig. 98).

Alone: — Lay one course of 2″ × 12″ in the bottom of the trench and longitudinally as close together and as nearly level as possible. Then transverse timbers of the size necessary to support the load (Fig. 99).

Calculate size of beam considering it uniformly loaded with *B* and of length *y*, fixed at one end (Fig. 72). If this requires a size larger than 12″ × 16″, it may be made up of two pieces, each 12″ wide, and $\frac{1}{2}$ the requisite thickness bolted together with $\frac{3}{4}$″ bolts spaced 6″ on centres, staggered both ways.

It is better, however, whenever a larger size than 12″ × 12″ is required, to lay a bed of concrete and use steel beams as heretofore described.

§ 278. Soft Soils: *Quicksand, Mud, Silt:* — Can often be held in position to start work on, by laying two courses of $1\frac{1}{4}$″ x 10″ boards, crossing each other at right angles, and laid diagonally in the trench, and often this is less expensive than drying the material by using a fill of sand. On such a flooring, the concrete may be laid and loaded so as to secure an initial settlement before commencing the footing.

§ 279. Sand and Gravel Fills: — Whenever the soil is a soft wet clay that cannot be drained, and that lies practically horizontally, and piling cannot be used, good results can be obtained by sheet-piling around the entire area intended to be covered by the works, and 10′ 0″ beyond the footings and then filling with sand and gravel 5′ 0″ to 10′ 0″ deep in layers 1′ 0″ at a time, and thoroughly wetting each layer.

Mud and silt may also be treated in this manner, when piling is impracticable, and if the spread beyond the footings is made four times the depth of the fill, the sheet-piling may be omitted entirely.

Sand Piles: — Piles are occasionally driven into soft earth or wet clay, then withdrawn and the holes filled with sand, well rammed, and the footings started on them. They may be considered as an engineering curiosity and are not recommended.

SECTION V. — CAISSONS:

§ 280. Description: — Are essentially boxes of wrought-iron either circular or rectangular in plan with a closed top in

which is inserted a small cylinder with air-tight doors so arranged as to be alternately open to the outer air and to the caisson. The caisson is sunk by admitting men into the space beneath the closed top to excavate the material from under the edge of the caisson, thus permitting it to sink. As the sinking progresses, water is excluded by keeping the pressure of the air on the inside of the caisson sufficient to keep out the water. The air-pressure is used to remove the material after the manner of an ejector carrying mingled air and mud through a pipe to the surface.

The caisson is carried down by building masonry above, sufficiently heavy to overcome the resistance of the soil until a sufficiently strong bearing stratum is reached, then the voids underneath top of the caisson and between the cutting-edges are properly filled with concrete.

§ 281. **When Used:** — Where the soil consists of a tough stratum overlying mud too deep to pile into, and where the initial loads are such that it is impossible to so distribute them as to keep them within safe limits, even when distributed over the entire area of the lot, the caissons may be used; but ordinarily they are not to be recommended, involving as they do considerable expense and great loss of time with an element of uncertainty.

Where the soil is homogeneous, it can almost always be relied upon for the foundations.

[To be continued.]

THE *GAZETTE DES BEAUX-ARTS* AND THE WORLD'S FAIR.

FOR the last few months, says M. Jacques Hermant in the *Gazette des Beaux-Arts*, the World's Fair at Chicago has opened its doors and invited the whole universe to a festival, which it was hoped would be the most marvellous of all those to which the world had hitherto been invited. Have the hopes been realized which it gave birth to, and procured for all those who have been tempted thither the satisfaction which they expected? It is difficult to say. The beginnings were laborious, surrounded by obstacles of every kind, due especially to a lack of method and experience on the part of the organizers, who were mere novices in the matter, and altogether too much convinced of their own infallibility. But it seems now that it is in the way of achieving more of a success than was expected, and one which must assure for it an important place amongst the curious and hardy undertakings of our century, so fecund in great enterprises. It deserves, then, better treatment than the rather unflattering articles of certain talented writers who have up to now taken the trouble to visit the Fair. By dint of smiles and sneers they have succeeded in creating in the minds of Frenchmen, so prompt to admit ready-made opinions, the idea that the famous World's Fair was only a colossal *fumisterie* hatched in the brain of certain Barnums, who sought to attract the notice of the world to the "phenomenal city." But if this impression is the one which was drawn from the beginnings of the Exhibition, from the Homeric struggles between the great cities of the North, from an advertising so exaggerated that in our eyes it reaches the farthest limit of the ridiculous, it is superbly ridiculous to be halted at this anecdotic and superficial stage and only cast in passing a smile at so colossal an accomplishment. Such an assemblage of works, if it does not make the exhibition at Chicago the equal of ours, none the less constitutes it an imposing manifestation of the efforts that America is making to raise herself to the rank of other artistic countries, and achieve for herself a reputation which the older Europe has denied to her. Are we not a little like those people who for an instant have been afraid, and who in the joy of extricating themselves from their false position, have only sarcasms for those who have not known in turn how to conquer their difficulties. Would it not be more intelligent seriously to study this enterprising unknown, who has just begun a struggle with us in the realms of art, and who seeks to show us in what fashion she has begun to handle the arms which we ourselves have furnished her?

When the organizers of the Exhibition, passing from the first studies to practical matters occupied themselves with the formulation of the final scheme of execution, they had an idea which appears singular to us, but very explicable in a country where decentralization is pushed to its farthest limits. After having fixed upon certain general, certain grand lines, not very well defined, but only intended to fix approximately the places which they judged proper to give to the principal buildings, distributed without order and without much method in the midst of the marshes of Jackson Park, they summoned the principal architects of the leading cities of the United States, and assigning to each a building directed them to work out their own schemes. A price having been agreed upon for the positive execution of the desired designs, the architects separated, some going to New York, others to Boston, Washington and elsewhere, and all set about studying their schemes without any other point of contact between them than the central service established at Chicago. The projects were made, brought to Chicago by their authors, subjected to certain minor changes, and execution was begun. Could there result from this one of those magnificent *ensembles* which leave the visitor under the powerful impression caused by a fair ordonnance whose general lines have been wisely considered? Evidently not. The difficulties which, perforce, resulted from the method adopted, perhaps also certain sage advice, quickly disclosed to the authorities the fault which they had committed. So they hastened to change their scheme by appointing an architect-in-chief to have general control of all construction. Unfortunately, this time inexperience was betrayed into adopting a measure which rendered the remedy worse perhaps than the disease. Since they had an architect and his staff, why did they not charge them not merely with the oversight but with the absolute execution of the works? The projects were there, but their authors were not there. Well, what prevented the chief-of-construction having entire control of the execution? From time to time the real authors might come and cast their eye over the work, and everything might progress as well as could be desired under a direction in this way become absolutely single. And it was perhaps upon the day when this decision was reached that the gravest fault was committed. If at the moment of conception unity of view is indispensable it is precisely at the moment when one comes to the detail of execution that division becomes necessary. A single man found himself charged with the execution of a score of palaces, commanding an army of inspectors and designers recruited from nascent schools from amongst any who were capable of holding a pencil, young men for the most part without experience, still ignorant of the complications of a profession abounding in ambushes and leaving perforce to chance the duty of solving difficulties which they were fitted neither to foresee nor to avoid. From this arises the startling commonplaceness of the details and those faults of proportion between different parts of one ordonnance which make the European, trained through long years to respect form in its purity, elegance and chastity, grind his teeth.

The buildings of the World's Fair, then, are not in general works seriously and really desirable so far as their details are concerned, but rather large sketches, without pretence, and carried into execution by not very skilful workmen. One should confront them, then, only from a very general point-of-view, just as one judges a sketch by trying to discover what were the artist's intentions. To tell the truth, these intentions are rare enough, and we believe that we have discovered the reason. To make different buildings to shelter the products of mines, electricity, mechanic arts, the industrial arts, the liberal arts, or those of agriculture, is to do nothing more nor less than to build vast sheds, surrounded and masked by façades more or less decorative in character. It is only by the ability shown in the arrangement, in the infinite science of detail, that one can succeed in varying the effects and give to each an individual character. Now this ability and this science are still wanting in America, too young in everything which concerns architecture to have acquired them. Those of the buildings of which we speak are of a disquieting commonplaceness. When, on the contrary, the elements of decoration present themselves to the mind in a more precise fashion; when there is no need to torture the imagination to discover effects which result naturally from the very subject of the composition, we behold the artist reveal himself, and show that he knows how to derive an ingenious *parti*, and produce an interesting work, as is the case with the Fisheries Building or the Transportation Building. There are, then, in America certain artistic natures which prosecute their researches successfully. They are still novices, but they are interesting and to be studied.

To thoroughly understand them, we must not stop amid the too hasty structures of the World's Fair. They must be sought for in the cities, where they have produced more serious works, responding more directly to the needs and usages of the country. A study of this nature will certainly be the source of more interesting reflections than a close and detailed description of the numberless buildings at Jackson Park.

In spite of the World's Fair, in spite of its unheard-of magnitude, in spite of the traces of a considerable German element, Chicago is and remains at present, so great is the power of absorption of the American people, a business city, where the search for money shows itself under all forms. It takes possession of the brain to the point of deforming almost all those who might be disposed to manifest tendencies for research and study, and reduces the artists themselves, who have come to establish themselves there, to mere artisans, who sell their merchandise, who set up offices of forty or more draughtsmen, and, whenever Lake Michigan becomes too inclement, can set off to breathe the warm air of the Mexican Gulf, while their "plan-factory" brings them in their millions [francs].

Now, if it is true that the architecture of a country may be at all epochs the most direct reflection of its customs and needs; if the immutable law of constant concordance between the genius of a people and the character of the monuments they produce has need of new confirmation, one could not find a more brilliant and more absolute one than in the constructions which to so great a degree astonish Europeans on their arrival in Chicago.

In a city where the observance of the arts is completely ignored, where the inhabitants (whom a narrow religious education hinders

from manifesting their joys and taking their pleasures openly) consider that loafing or getting enjoyment is losing precious time, where for every one the very end and aim of life is the gaining of much money — and when one has gained much of it, to make use of it to gain still more — what must the art of architecture produce? Utilitarian buildings. Where necessarily must one go to find a characteristic effort? To the buildings destined to shelter and facilitate labor. Just as there remains to us from ancient architecture, the temples, basilicas, the baths and the circuses, corresponding to the principal needs of existence with the people of Greece and Italy; just as, later, we see the church, the feudal castle and the town-hall, symbolizing the three grand elements of the Middle Ages, religion, feudalism and the communes; just as we find in the great imperial and royal châteaux the expression of the overwhelming power of absolute monarchy, so we must find perforce in the productions of the most American of all cities buildings of a very individual character, bearing an expression acquired from the need of labor, which is the very essence of the American genius. All these constructions can be reduced to a general type — the "Building," *par excellence*, with its inevitable accessories the post-office box, the telegraph and telephone office and the messenger-station. This is the palace, the temple of labor, in which everything is conceived, combined and studied in a fashion to render *work* easy, agreeable and as little fatiguing as possible. To comprehend this conception, which is quite peculiar to the American people, at once practical, original and very characteristic, it is necessary to know something of the manner of living and working of every American, when he is not travelling. He makes of life two distinct portions, one of which belongs to the family, the other to his work, and these two portions have in general no points of contact between them. The family and the home are most often far from the centre of the city in some north or south quarter exclusively occupied by private habitations and connected to the heart of the city by electric or steam tramways, elevated railroads or simply by a steam railway at the end of an immense straight avenue, whose length reaches twenty-five or thirty kilometres. There each one has his house, from the humble wooden structure built on piles, with a little flight of stairs, with a few steps for the approach, which still preserves in its uncertain stability the somewhat savage air of a pioneer's hovel, and makes one think of the houses on wheels which our European nomads drive over our roadways — from these to the suberb palaces of these kings of the "mighty dollar," which contend with one another in might and massiveness. Labor, on the other hand, is never lodged near enough to the centre of things, never close enough within reach of everything which modern science puts at one's disposal for facilitating affairs and the transaction of business. The contact between varied interests is never close enough. If it were possible to realize some gigantic conception, uniting in one single building all businesses of every kind, one would certainly then satisfy the idea of the American. While waiting for the construction of this Tower of Babel of a new kind, the present realization is curious enough. In the centre of the city rise by scores immense structures, sixteen, eighteen, twenty and even twenty-two stories high, whose enormous square masses dominate by almost their whole height the rest of the city. Like donjon-keeps, they loom strongly out of the mist of gray smoke which envelops them and gives to them the distinct resemblance to the fortresses of another age. Externally, the aspect is generally the same — a high basement, including a ground-floor, a first story of a strong and squatty architecture, most often inspired by the Romanesque or Byzantine style. An immense full-centred arch, whose springing is very near the ground, and is supported by enormous columns of granite, serves as entrance. Upon this basement is reared a great vertical portion engulfing in one single motive ten or twelve stories, and even more. Most often it is a series of broad brick piers, bound at the upper part by full-centred arches, also of brick, and forming thus an infinitely high and narrow arcade, regularly divided into as many equal parts as there are stories, with one window in two or three divisions per story. All these windows and each bay through the whole height are similar — not merely similar, they are identical, and suggest very clearly the appearance of a hive, from which each cell has an outlook on the outside.

Above this arcading is a frieze consisting of a row of small bays — often treated in the spirit of those delicious galleries which terminate the Florentine and Pisan towers — and to crown the whole, by way of a cornice, a strong, mighty slab of great projection, which, by its mass and importance, gives to the whole an air of grandeur, robustness and simplicity which is truly impressive. These edifices are extremely curious, for they are in the frankest way original, and built with that evident preoccupation to do only that which is necessary to create the impression of majestic force and calm which their great height requires. Everything, even their decoration borrowed from primitive styles, contributes to make of them a real creation of a new people, primitive in matters of art, unconscious of their own force, who as yet still toddle, and only know what others have taught them. Wait half a century, perhaps a whole one, and the American who wishes to owe nothing except to himself will surely by that time have succeeded in divining the formula. On that day, Europeans, all astonished, will, perhaps, be obliged to go and search beyond the Atlantic for that new expression answering to new needs which we all seek after with so much passion, and to which we do not attain, fossilized as we are in the traditions of the School.

THE GREAT EXHIBITION REVIEWED.[1] — II.

AS AN ARCHITECTURAL SYMPOSIUM.

THE Exhibition is not great alone as a spectacle, nor is this spectacle thus presented in any way derogatory to its main purpose. This part and a large part of the educational features of the programme are such as have never before been carried out to an extent in any previous undertaking. It has been an essential such factor in furnishing an attraction that has brought greater masses together than would otherwise have given it their patronage and has thus contributed to a financial success which is now assured. The spectacle presented by the main grounds is in every way dignified. The Midway which is mainly an amusement feature is fortunately an arm of the park, and not an integral part of it, and hence can in no way mar the general effect.

In making the exterior of the exhibition spectacular, an opportunity has been given for an architectural symposium, especially appropriate to an International Exhibition, and such as the world has never before witnessed. The possibility of presenting the forms of dignified and highly elaborated architecture and sculpture, in inexpensive materials has been availed of to the utmost. This was at first thought to be of doubtful expediency. As the work was cheap, cheap and tawdry effects were feared. Now that there has arisen a popular clamor that the buildings be retained for some time as works of art, it is evident that few realize their unsubstantial character. It is little appreciated that they are all carefully watched and kept in constant repair lest the illusion be dispelled before the rapidly approaching last day of October. The dropping-off of a few pieces of the staff covering from either of these structures would soon betray their fictitious character. But this only explains how well they have fulfilled their purpose, and why so much has been built with the means at the disposal of the construction department. The popular verdict based on a supposition that these buildings might stand for years, has set at rest all anticipation of a possible failure in the architectural effects, or the methods of construction that have been employed.

From a critical standpoint those buildings which are constructed with wooden frames covered with staff, are only full-sized models from architectural designs executed with every possible illusory effect, and associated with each other with their surroundings and landscape effects as they would be if permanently erected. In doing this it has been found that cast staff, which is nothing but plaster-of-Paris permeated with hemp, when made of the plaster that is manufactured in Michigan bears a remarkable resemblance to marble. But where plain surfaces of the exteriors have been plastered on lathing of any kind, not only is such a resemblance almost unattainable, but the surfaces are not straight and the plastering is liable to drop off unless it is done with very expensive materials. It has also been found that buildings can be covered more expeditiously with blocks of staff one inch thick, than with lath and plaster, and that such work can be carried on in the coldest as well as in rainy weather, while it is vastly more enduring as far as time is concerned, and can be preserved indefinitely by the use of good oil paint.

White marble would have been the appropriate material for those buildings which compose the Grand Court. It is, therefore, fortunate that they were cast in staff and proper that the colors which various kinds of nearly white marble assume should have been preserved in the subsequent treatment. As a result the correct expression of the design is as nearly perfect as possible. To the ordinary observer they are real buildings and the illusion is perfect; and it requires but a small stretch of imagination for even the initiated eye to see them in the same light.

There are two grand perspective effects in the Grand Court, one from the east and one from the west. That from the east has the Administration Building for its objective-point with the fountains in front of it. That from the west has the Statue of the Republic for its objective-point and the Peristyle arch for its background. In these perspectives the buildings on each side are in perfect harmony with each other and the whole Court. Fortunately their uniform cornice-lines are not high, yet those accustomed to high buildings do not complain that they are low. We are so far removed from the irregular perspectives and generally ugly sky-scrapers of the great city as to almost forget their very existence as a disturbing element. Even the end of the great Manufactures Building on the north side does not dominate the court, for it is only the end that enters into the composition. The great height of its roof and the irregular heights of the roofs of the other buildings composing the Court, are not evident in the general views. The Administration Building alone dominates the general design. It was intended that it should. It is hard to realize that these buildings are the works of different architects, all men of national reputation. Nothing but the admirable plan devised by Mr. Burnham of bringing together leading members of the profession to act in coöperation, and yet independently as to design and details, could have produced this result in so short a time.

In selecting Richard M. Hunt for the most prominent work, he did honor to one whose name is more intimately associated with the advancement of the profession in America than any other. He has alike been honored not only by the praise bestowed upon this work

[1] Continued from No. 928, page 8.

by his fellow-practitioners, but by the recent award of the Royal Gold Medal of the Royal Institute of British Architects. From the time that he was selected, he seems to have been inspired with a full sense of the responsible nature of his task. This design must have been at once conceived as a whole, and is not the labored result of repeated studies, for the executed building does not differ materially from the original sketch.

Before referring to it in greater detail, a few facts from the architectural history of the Grand Court and the Exposition may bring into stronger light the success of the great achievement. Neither the Grand Court nor the whole plan of the Park was the result of a simple comprehensive plan, as some may have supposed who have testified to its completeness and the absence of blunders. No one man and no body of men could have conceived all its varied features, and recorded them on paper before executing any of the work, and have time enough left to make the improvements and erect the buildings before October, 1892. It was absolutely necessary to begin the work on a tentative and elastic plan, which was modified and enlarged from time to time until the whole ground was covered. No general plan of landscape or building work was adopted until after the death of the lamented Mr. Root. The numerous sketch-plans of grounds and buildings made by him before the Council of Architects was appointed were of the greatest value in enabling the Directors to realize the extent and varied nature of the work they were expected to do. These now hang in the office of the Director-of-Works, silent witnesses of the enormous labor performed in such a brief time by this master-mind; but they in no respect show anything that has since been accomplished, except that there should be a grand basin of water, similar to that of the Paris Exposition of 1889, around which the principal buildings should be grouped. Where this basin should be, and how treated, was as yet undetermined. The Council of Architects, with Mr. Burnham acting as moderator, fixed the position of the longitudinal axis of the Grand Basin and its dimensions, and decided that this should be the starting-point of all the improvements in every direction. They also decided on the width of the Court, but not its length, and located four main buildings, two on each side, and the Administration Building on the axis of the basin and to the west of it. This action was approved by the Directors in the latter part of January, 1891, and the architects separated to make their designs. When they were ready — and they were only preliminary studies — they assembled again and compared notes. Their proceedings are set forth in brief in Mr. Burnham's paper before the International Congress of Architects, and the full history of the conception and execution of the work will be given in his coming official report. This was the meeting in which they realized the value of concerted action and co-operation, as well as friendly rivalry, in which nothing but reputation was at stake. They could begin to see their work in its unity. Each design was subjected to friendly criticism. Defects were seen and corrected, and the general plan came up again for consideration. This resulted in changing the position of one building, turning it around so that its end faced the Court, and thus making room for another building facing the Court. It opened another of those grand vistas for which this exhibition is so celebrated, and of which so little has been said. (It is the view of the Administration Building from the lagoon bridge to the north, where it is seen almost in elevation, at the end of a perspective formed by the Electricity and Mines Building.) This action brought the work of Mr. Beman upon the Grand Court, and provided definitely for six main buildings.

Meanwhile, after the first meeting of the Council, Olmsted & Codman had been determining the boundaries of the lagoon and the Wooded Island, so that the engineers could begin their work, and had laid out the canal (so called) which crosses the Grand Basin at the western extremity, and connects it with the lagoon to the north, the lagoon being connected again with the North Pond, which already formed one of the permanent improvements of Jackson Park. Thus the whole water-plan of the grounds, excepting what was afterwards designed as the "South Pond," including two inlets from the Lake, was determined upon, and the way made clear for obtaining sites for four more buildings which it had been decided to build, and the Woman's Building, for which a location was needed. Three of these buildings were the Transportation, Horticulture and Fisheries. The fourth was the Venetian Casino and Tower, which it had been decided to construct on piling in the Lake, connected with the Grand Court by a pier, and the work had been assigned to Francis M. Whitehouse.

Nothing had yet been done about the Fine Arts Building, which it was then thought would be built down-town, on the Lake Front Park, together with the Music-hall. It was the fond hope of his friends that the design for the former by John W. Root, which had been completed in pencil from his own hands, and was the last work he ever did, would be carried out.

Thus the second meeting resulted in the location of all the largest exhibition buildings, except that of the Fine Arts, and left both ends of the Grand Court open, though it was thought at the time that the Administration Building would form a fitting termination to the west end of the Court. This it would not have done. But it was, fortunately, placed so that its north and south axis came between the Electricity and Mines Buildings, resulting in the vista that has been referred to. The Mines Building extended somewhat to the west of it, and the necessity for increased room in Machinery Hall resulted in extending its façade, in a modified form, farther west. The intention was to have a one-story railroad station to the west of the Administration Building, and a system of circular tracks to the west of this for delivering passengers directly into the grounds. These would have taken up more room than the system of stub-end tracks that was afterwards adopted. When at last the whole system of railways entering the Park was changed — which was a year after the time we are speaking of — an opportunity was given for closing the west end of the Grand Court with a monumental building, which left the Administration Building near the centre of a plaza, where it can be seen from every point-of-view. This building, the Terminal Station, unfortunately but little used yet doing a most important part in completing the perspective of the Grand Court, is the work of Charles B. Atwood.

The east end of the court, through which was a clear view of Lake Michigan, was the subject of serious discussion by the Council of Architects, and it was a long time before its ultimate treatment was decided upon. All that remains of the original design is the colossal gilded "Statue of the Republic," by French. It was the most difficult problem to handle of all that were encountered, and the only one which there was any delay in coming to a unanimous conclusion. It is not to be wondered at, therefore, if it should not be above criticism.

Nearly all the published bird's-eye views of Jackson Park show the original design prepared by A. St. Gaudens, the Director-of-Sculpture. It provided in a semicircle for thirteen independent columns supporting statues. Between these there would have been an almost unobstructed view of the Lake from every part of the Court. Beyond them would have been a view of the Venetian Casino and Tower rising from the water, and the whole effect would have been much more Venetian than it now is. In fact, the inspiration must have come from the Piazetta of Venice, with its historic columns and the distant view of the islands of the lagoon. Lake Michigan seems to have impressed this body of artists as having a Venetian placidity such as the average Chicagoan cannot appreciate at all seasons of the year. To those living on the spot, it is more noted for its terrors than its pleasures, except as a beautiful thing to look at, and it is a wonder that Mr. Burnham so long entertained the idea that the Lake could be converted into a lagoon. Subsequent events, one of which was the filling-up of the lagoon, as far as built, with sand during the first winter, demonstrated that a much larger pier would be required for the landing of boats, and that the Casino was needed on dry land, or, at least, where it would be better protected from storms. A moderate-sized music-hall was needed — or it was then thought that it was needed. There were two excellent sites for these — one east of the Agricultural Building, the other east of the Manufactures Building — even though they might have to be built on piles driven through the water of the Lake and protected by stone-filled bulk-heads. It was a simple matter to connect these by a colonnade and entablature. The centre of this was the proper place for the "Columbus Arch," being the nearest point to the inland sea, which could at times give the suggestion of ocean, for no land is in view from its shores at this point. Thus far no architectural tribute to Columbus had yet been offered, except the proposal to erect a fac-simile of the old convent of La Rabida on the rock-bound eminence to the south, as was done later.

These suggestions first came from Charles B. Atwood. They were adopted. The Roman-Corinthian order of the Casino and Music-hall carried across the end of the Court with the Columbus Arch, surmounted by the "Columbus Quadriga," in the centre are his designs. The two buildings especially were necessary to complete the architectural perspective of that end of the Grand Court. The arch, which should some time be perpetuated in permanent materials, is his greatest work. It would be very appropriate after all the great buildings on the Court have become only a memory, that this arch should stand and be kept in repair until the time comes when it may be replaced in enduring stone. The statue of Columbus, by St. Gaudens, which now stands in front of the east entrance to the Administration Building could then be moved to the centre of the bridge which is now under the arch and connects the two sides of the Peristyle.

There is no question as to the magnificent effectiveness of the Peristyle as seen from the lake, nor is it architecturally any less effective when seen from the Court. It is the connecting link that was needed and an admirable background for the Republic Statue. But it certainly obscures the view of Lake Michigan to such an extent that it looks as if it were put there for that purpose, and it is a question whether or not the spaces on each side of the arch should not have been more open, and treated like the great arches of Mr. Atwood's Terminal Station, rather than repeating the peristyle effect which had already been given in the Machinery Building and the South Colonnade.

It is natural that when it was decided on account of the want of filling material, to treat the World's Fair site as a system of lagoons with sloping shores and canals bordered with terraces upon which the buildings were to be erected, that a resemblance to Venice should have been suggested. This was so, to a certain extent. But as the designs of buildings began to be developed and the work began to take on a more Classic form, far removed from Venetian picturesqueness, the Venetian idea became less prominent in the

work, and it became more and more evident that a creation of such grandeur needed no prototypes. Destiny seems to have decided that it should develop its own originality. So there is nothing of Venetian feeling left except a suggestion on the Rostral Columns that decorate the terraces of the basin. There is not a building on the main grounds that can be called Venetian in style, and the building of the Venice-Murano Glass Co. in the Midway is little more than a travesty on it. There is more approach to a Venetian effect where there is no water. The plaza around the Administration Building somewhat suggests the Piazza di San Marco. But here the point of attraction is the great building in the centre, while there it is St. Mark's at one end. The suggestion rather comes from the fact that most of the buildings on the plaza have loggie on the ground-level.

The flag-staffs rising from the ground with their beautiful decorated bases heighten the effect wonderfully, and the band-stands and chocolate pavilions which were thought to be intruders tend by contrast to greatly magnify the Administration Building. It not only towers above all its surroundings, but like few other buildings that have been erected can be almost said to tower above criticism. It is the apothesis of Classic and Renaissance architecture by one of the great living masters. It dominates and is the keynote to the Grand Court as a whole. It cannot be appreciated in all its beauty and grandeur except in connection with the surrounding structures. It is the keynote of the Grand Court. Without it there would be no Grand Court. Without St. Mark's the piazza would be a series of ordinary buildings with no apparent connecting link. The sculpture by Carl Bitter was all inspired by Mr. Hunt. Suggestions of every group were on his original sketch, and it is as much a part of the design as the hands and head are part of the human body. The groups do not dwarf the building by their colossal size. The cornices of the four corner pavilions are on a level with those of the buildings surrounding the Court. All below this point is but a base to carry the main design. The four-story pavilions serve only as buttresses to support the central mass of the design, and the subdivision of their double arches into many small windows only serves to give scale to the superstructure. The great octagonal dome, designed on lines more nearly approaching those of Florence's great cathedral than any other, does not need a lantern or central ornament to give it height. In this it is like no other of all the domes of the White City.

The peculiar feature of the Grand Court in which it differs so much from anything heretofore seen is the double terracing of the ground on each side, affording walks on two levels and two lines of Classic balustrades, the pedestals of which are not surmounted by sculpture of animal forms. The credit of this part of the design is due to the late Henry Codman, partner of Mr. Olmsted. An unusual effect is produced when the Court is crowded with people, somewhat like that sought in American theatres, wherever a good system of seating demands that the audience may be able to see itself. For, looking across the Court on a crowded day one can see twice as many people as would otherwise be the case. Nothing gives the Court greater apparent size than a mass of people, who give proper scale to every object within it.

Such is the architectural symposium of the Grand Court, or Court of Honor. But it is little more than half of the canal system, to say nothing of the lagoons. The South Canal which intersects it, is no less attractive in its spectacular and architectural effects. At the south it is closed by the Colonnade which screens the wall of the Stock Pavilion. This colonnade is a continuation of the details of the Machinery Building, and from the north appears to connect it with the Agricultural Building.

The double terraces continue the whole length of the South Court. At the south end the lower terrace spreads out in a circle and serves as a foundation for the Exposition Monument. Probably in all accounts that have been written of the exhibition as little has been said of this as of any of its prominent features. Around the base of the monument are five concrete steps, which though little frequented offer a grateful resting-place to the weary sightseers. From this point, as we turn our backs to the Colonnade, opens up the grandest perspective revealed by this wonderful achievement of all the arts. We can find no fitter resting-place than this. P. B. WIGHT.

BRITISH LABOR STATISTICS.

"STRIKES and Lockouts" is the subject of the most recent Blue-book on labor issued by the British Government, and in it the wide topic of trades-unionism and labor-agitations generally throughout the kingdom are also fully treated, because, the compiler says, it is impossible to thoroughly understand the history of a strike without a knowledge of the larger movement going on outside of its immediate locality and trade. The book was presented to Parliament by the Board of Trade some weeks ago. Its facts are supposed to relate specifically to the year 1891, but in many matters they are up to date of the end of 1892.

A comparison of statistics as to the unemployed in various trades for a number of years past shows the present existence of a greatly depressed condition of the labor-market throughout the kingdom. It began in the latter part of 1890, and had grown steadily worse down to the close of 1892, when the statistics were closed. The experts reached the conclusion that trade will continue to fall away until the end of 1893. In 1890 the average percentage of unemployed was 2.02, in 1891 it was 3.39, and last year it rose to 5.25. During 1890 there were many strikes for an advance of wages. In 1891 there were very few such, but a great many in resistance of reductions in wages, showing the declining condition of trade. There were 893 strikes during 1891, affecting 4,507 business concerns, and 13 lockouts, affecting 48 concerns. More than one-fifth of the strikes were connected with the textile industries, nearly 15 per cent with mines and 16 per cent with the building trades. More than half the strikes were because of disputes as to wages, and nearly one-third on account of demands for increased wages. While 45 per cent of the strikes over wages were successful, and one-fourth more partially so, the number of persons engaged in the unsuccessful strikes was very much larger than in the successful ones. Twenty-three strikes were over demands for fewer hours of labor, and most of them were more or less successful. There were forty-seven strikes against the employment of non-union labor, and one-half, comprising by far the larger proportion of individual participants, were entire failures. Thirty-one strikes were of curious origin, arising out of disputes between different sections of workmen as to the demarcation of their respective trades in jobs on which they were conjointly engaged. In 676 of the principal strikes 266,885 persons were engaged. Out of this number only 68,247 were entirely successful, in attaining their desires: 98,127 were partially successful, concessions being made on both sides, and 92,763 were entirely unsuccessful. The building trades achieved more success in their disputes than any other branch of industry, a fact attributed to their superior organization and other special circumstances.

The strikes of the year had an average duration of about four weeks. A close estimate places the total weekly-wages bill lost by the strikes at £381,000, which makes the total amount of wage money forfeited during the year, on the basis of the four weeks' average, more than £1,500,000. The total is figured at a much greater sum by the trades-unions. The capital laid idle by strikes is a most important consideration, and the loss thus occasioned is vastly in excess of that represented by the wages lost to employés. The amount thus thrown out in but 293 of the 4,507 establishments affected by strikes during the year was about £9,500,000. The various trades-unions were actively interested in 261 strikes, involving 51,203 persons, and the maintenance of these strikers cost the unions £146,000.

The eight-hour movement did not make much progress toward definite settlement during the year, although the question was prominently before labor organizations and employers. Several private employers voluntarily initiated the eight-hour day, but no general action was taken of any kind, and the question is still moot.

An interesting subject is treated under the head of "Public Contracts and Fair Conditions of Labor." In this direction, says the Blue-book, trades-unions and workmen generally have been very active during the year. "This activity has manifested itself in most districts by increased attention to matters of municipal government, and also in the exercise of the political influence of the unions in Parliament. On county councils and other municipal bodies a greater number of direct representatives of labor have been elected than ever before, and the cry for fair conditions of labor in work executed for the community at large has met with a large share of public acceptance and has been popular among most classes because it embodied a demand for justice not only for the workers, but for the fair and honest employer, who, in paying his men at the highest standard, was undercut by those who paid at the cheapest rates. Thus, in many public bodies now, it is a recognized principle that in all contracts a clause shall be inserted insisting on the payment to the workers of fair wages as recognized by the trades-unions, and the maintenance of such hours and other conditions of labor as are customary in the trades concerned."

The establishment of labor agencies is engaging the earnest attention of both employers, unions and workmen generally, and the tendency is largely toward making this the business of the municipal or national government. The Trade-union Congress in Glasgow last year formally declared that it was necessary a labor exchange, modelled after the Bourse du Travail of Paris, should be established and maintained by public funds in every industrial centre in the United Kingdom. The Association of Chambers of Commerce, representing the capitalists of the country, has also affirmed the desirability of such agencies, and suggests a National Labor Bureau. Considerable change, and apparent progress is manifest on this point. Employers were at first inclined to look on such propositions as socialistic, and several labor-bureaus were started by private gentlemen in a philanthropic spirit. These latter now say "the work would be much better executed by the municipality or the State." The trades-unions several years ago opposed the idea, believing such bureaus would nullify their organizations. Their change of front is evidenced in the Glasgow resolution. The testimony of the Blue-book is all in favor of the labor-bureaus, and the conclusion is stated that their action is very beneficient.

The one most notable thing about the multiplication of blue-books on labor, of royal commissions on labor, the anxiety of the politicians to treat with and please the labor vote, and the general prominence of labor matters, is that "the man with the shovel" is become a power in the State, not in England alone, but conspicuously all over Europe, a marvellous change from the old order of things. — *New York Sun.*

THE QUARTIER LATIN.

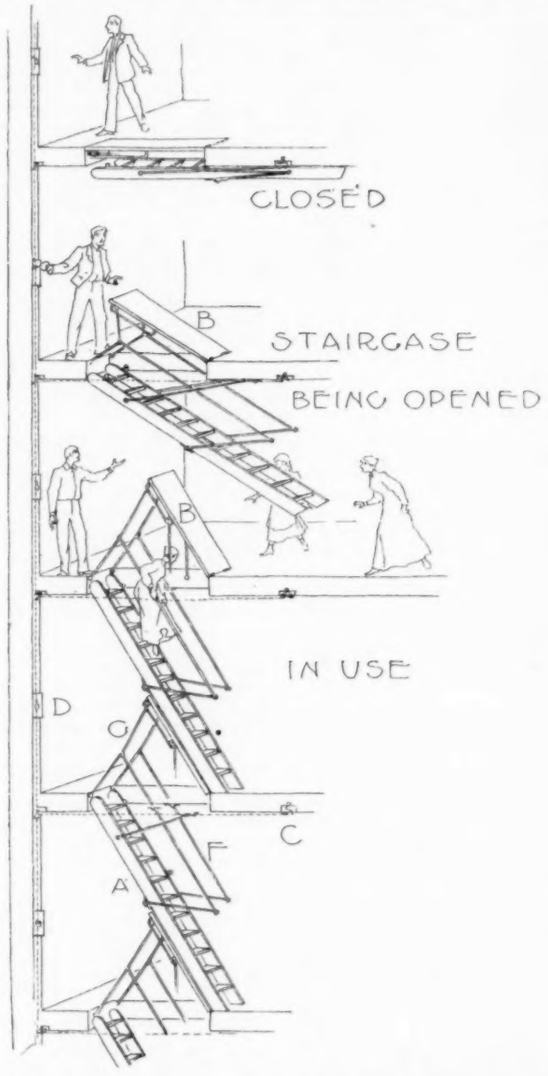
ALTHOUGH the glories of the Quartier Latin, says the Glasgow *Herald*, have long been matter of more or less ancient history, it is still not without a twinge of regret that one reads the statement of a Paris correspondent that the old scholastic buildings in it are fast disappearing and that the whole district is getting a thoroughly modern look. The old Sorbonne and the School of Medicine have been replaced by huge blocks of buildings in the style of the nineteenth century; the Law School has been enlarged and embellished; and now the shadow of the doom of renovation hangs over the Lycée Louis le Grand. It is true that none of these buildings, as buildings simply, had anything like the historic interest and antiquity of the venerable colleges of England, for upon this, as on the other quarters of Paris, the hand of Haussmann and of revolution has been laid. Yet, all the same, the removal of them takes us one step farther from the great age of what to the historian of education is certainly the most notable spot in Europe. The Montagne Latine, with its narrow streets, its tall, dark houses, its gloomy courts and low-browed archways, was not only, as Le Clerc describes it, a second fatherland to the mediæval student; it remains also, in tradition at least, as a kind of scholastic Jerusalem or Mecca. The university which had its seat there was not, it is true, the oldest of European universities, for Naples and Bologna in point of time came before it; but as the first and the greatest at which "arts" as opposed to law and medicine were studied, it was reckoned the mother of them all.

From the time of Abélard, its virtual founder, it was thronged by students, as many as 30,000 at a time, from all parts of Europe, from Lothian and Lombardy, from the banks of the Vistula and the plains of Castile. How much it was frequented by scholars from our own island may be seen from the fact that one of its "four nations" was the nation of England. And from Italy its fame attracted even the great poet of Florence, who in his exile is said to have disputed at Paris on theology, and who in the "*Divine Comedy*" makes familiar allusion to the students in the Street of Straw. A turbulent band they were, these students, deep often in disputes not at all philosophic or theological, begging at times (for they were poor enough) like Luther in the streets of Eisenbach, thieving at others with M. François Villon, and with Jean Frollo hearing the chimes at midnight and beating the ineffectual watch. They had their own judges, their rector and chancellor, by whom alone they could be punished, for as a quasi-clerical body they were exempt from jurisdiction of the civil power. But so outrageous did they grow that sometimes the civil power had to intervene, and in 1229, for instance, Queen Blanche of Castile, the mother of St. Louis, called out the military, as it were — sent her men-at-arms against them — with the result that many of the students and professors left Paris in high indignation and disgust. The University never quite recovered from the shock of this disruption, which carried many of its best teachers to Toulon and Orleans, and even to Oxford and Cambridge. One indirect result of it, however, was the institution in 1270 of the Sorbonne, the famous college which became afterwards one of the chief theological authorities in Europe, but which at first was simply a lodging-house wherein the young fledglings of divinity might be made to keep decent hours.

So old are the traditions of Bohemianism in the Quartier Latin. The scapegraces of the romantic movement were foreshadowed by Villon; the immortal quartette of Murger have their prototypes in Pierre Gringoire, and in the gamin-scholar of "*Notre Dame.*" Play and work — the most riotous and reckless play, and work the most stern and laborious — are alike characteristic of this region; it has been the temple of plain living and high thinking, and the den too of orgies, such orgies, at any rate, as are possible to the prodigal who lives mainly on a precarious allowance of husks. It is true that there have been other and older Bohemias than that of Schaunard and Marcel, just as there were more ancient universities than that of Abélard. Bohemia, as was said by its annalist and *vates sacer*, has existed wherever genius and vagabondage were combined, and sometimes even where vagabondage was found without the genius. A knack of rhyming or daubing, a weakness for late hours and roaring suppers, a crop of long hair and a short purse, and a hearty acceptance of Pistol's dogma that "base is the slave who pays" — these have been known in ancient Rome and in the modern Fleet Street, as well as in the old scholastic quarter of Paris. Nevertheless, it is with this last that we associate them in especial, so that every artistic and literary waster pays his homage to the ground that has been made holy by the lives and riots and adventures of the famous *cénacle de la bohème*. Fortunately no architectural renovations can destroy the haunts of that brotherhood; Musette and Mimi and Rodolphe, no more than Pierre and the Moor and Shylock, are to be swept or worn away. The Quartier Latin has its place in that land of romance where ruin and renovation are alike unknown, and there its rush-strewn halls and fireless garrets are filled by a joyous and reckless crowd of scholars and artists, among whom the lover of literature recognizes some of his best and oldest friends.

AN EMERGENCY STAIRCASE.[1]

ONE difficulty in connection with the recent Acts under which additional means of escape in case of fire have to be provided in all factories, asylums, theatres, hospitals, and wherever large numbers of people live or are employed, is that staircases of the ordinary description occupy more space than is always available. The object of the emergency staircase, invented by Mr. S. T. Rawlings, is to meet this difficulty, and also to furnish a convenient extra exit from upper floors or galleries for all public or private buildings. It is claimed that it forms a complete and very substantial staircase, always ready for immediate use, and yet, when not in use, it takes up no available space. A series of light staircases are kept suspended under the ceilings below trap-doors placed in the floors of upper rooms, and on a catch being pulled out they drop immediately and open the trap-doors, which are so balanced as to allow the stairs to fall gently to the ground. Small cupboards in the wall of each room contain the handles D, which are connected with the wires, represented by dotted lines, for lowering the staircases. In case of necessity the glass fronts of these cupboards should be broken, which causes



a bell on each floor to ring, then, on pulling the handle D, the catch C is released, and the stairs A drop down simultaneously, opening, at the same time, the trap-doors B in the various floors, the handrails F and guards G extending on either side of the stairs, the later serving to prevent persons from falling into the opening. The stairs can be placed directly under one another in a continuous length at right angles to each other, or in any other position that may be desirable. The apparatus can be made plain or ornamental, in harmony with the other rooms or corridors in which they may be placed, and is suitable for any buildings in which a number of persons are likely to be on upper floors at any one time. Amongst other advantages

[1] The illustrations in *Invention*, after which our cut is prepared, are so imperfect that it has not been possible to determine with precision how this apparatus is jointed and pivoted. The cut must therefore be taken merely as a sketch suggestion. — Eds.

claimed for it are that it can be fixed without any structural alterations or interference with the present arrangements of furniture, fixtures or machinery; that when open it does not form a flue to attract fire or smoke; it is so constructed that it can be used by the infirm and the most timid without assistance, and, besides being so nicely balanced that if it were opened whilst persons were standing beneath, it would not drop with sufficient force to hurt them; it is so guarded that even in the event of a panic it would be almost impossible for those descending it to fall. It has been fitted up in many factories, asylums and public buildings, and is considered a practical and useful invention, easily worked, not liable to get out of order, and affording a safe and speedy means of escape in cases of emergency. Any further particulars can be obtained from the patentee and sole maker, Mr. S. T. Rawlings, South Parade Works, Frome, England, where the staircase may be seen arranged for use.

THE METROPOLITAN MUSEUM AND ITS SCHOOLS.

DURING the last ten years the Metropolitan Museum has made rapid strides. Though its permanent endowment is small, so that the Trustees have every year to make up a considerable deficit out of their own pockets, it has been constantly in receipt of handsome gifts, and the city has furnished a suitable building to contain them, which is now for the second time in process of enlargement. Some years ago the Museum seemed to contain hardly anything but the Cesnola collection of antiquities from Cyprus, other things being comparatively so few and inconspicuous. But this disproportion no longer exists. The antiquities from Egypt, the unrivalled collections of ancient glass, the Japanese pottery and carving, the tapestries, lace and embroideries, ancient and modern, the iron, gold and silver work, and the special collections, such as the Moore Collection, and the memorials of Franklin and Washington are equally conspicuous and important. Seven or eight galleries contain pictures, many of which are famous masterpieces, and remarkably few of which are of inferior quality, while the collections of casts of architectural details is one of the largest, most carefully selected and best arranged in existence, and the models of the Temple at Karnak, the Parthenon, the Pantheon and the Cathedral of Notre Dame are the only ones of their kind. The new wing is to contain a collection of casts of ancient and mediæval sculpture, which will give the Museum in this respect also a foremost place among the great museums of the world.

Meanwhile the Trustees have not forgotten that a museum is made for study as well as for diversion, and have from time to time set on foot classes in drawing, painting, modelling, bronze and iron work, architecture and ornamental design. It is now, however, no longer necessary for the Museum to give elementary and preparatory teaching. This is as well or better done elsewhere. The Trustees recognize, as the prospectus they have lately issued proclaims, that their main duty in the matter of education is to make their collections intelligible and serviceable to the public and to students of art. To this end they propose, as the means at their disposal may permit, to arrange for public lectures upon the various branches of art illustrated in the Museum, and to organize special classes of artists and artisans for the special study of different collections. At the same time the elementary classes in drawing and painting, from the antique and from the life, which are already established, will be continued, at least for the present, in the hope that they may become self-supporting. Then the funds at present consumed by them can be devoted to other uses more germane to the Museum's proper work.

These classes are in the best of hands, under the general direction of Mr. H. S. Mowbray. He has as his assistants, Mr. Levy, Mr. Clinedinst and Mr. Beckwith, in drawing or painting, and Mr. Herbert Adams in modelling. The fees are very moderate, being only thirty dollars a year, and forty for the life class, which, however, is open only to women. The rooms are well-lighted and comfortable, and the instruction of the best. The reputation and experience of the teachers would be ample warrant for that. Last year they had one hundred and forty students.

In addition to these classes, the Trustees have already begun the work of directly utilizing their treasures for purposes of instruction. For the public, they, last winter, under arrangement with the Trustees of Columbia College, set on foot a course of free lectures, which were largely attended, and it is proposed to have other courses from time to time, given by experts in the various arts which the Museum illustrates.

They have also established a class in architectural drawing for the special study of the architectural casts and models. Twenty-five students last year attended this instruction, which, so far as it goes, is exactly the same as that in the Department of Architecture in Columbia College. It fits young men to enter offices as draughtsmen, or to pursue to advantage elsewhere more advanced studies in architecture or in the decorative arts. The fees are fifty dollars a year. The class-work comprises exercises in pencil and brush work, in architectural drawing and design, and in projections, shades and shadows, and perspective.

But the most important and interesting class is an advanced class in painting, established under Mr. La Farge's care, for the study of the collections of paintings, the members of which may become candidates for the Jacob H. Lazarus Travelling-scholarship. It consists of young artists, both men and women, who have got through with their preliminary studies, and most of whom have studios of their own. To these will this year be joined the best students from the National Academy and from the Art-Students' League, who will be admitted free of charge on the recommendation of their instructors. Prize-students will also this year be present from Buffalo and Detroit, and probably from Boston and Washington, and efforts are making to send young men also from Chicago, St. Louis and Baltimore. These students will meet Mr. La Farge at the Museum twice a week, and make such drawings, paintings and sketches as may be required of them, working partly in the Museum or other galleries, partly in their own studios. The character of these exercises is, in the case of each student, necessarily determined by his attainments and personal predilections, and they are arranged so as to aid rather than to interfere with his own studies or work. The men of the class, which is, however, as has been said, open also to women, may in the spring become candidates for the Lazarus Scholarship. This gives the successful competitor a hundred dollars a month for two years, with which to travel and study abroad.

This is the most advanced step taken in this country in the way of artistic education, as it is the most generously endowed. It has been organized under the advice of many of our best artists, and the effort to extend its advantages to students outside of New York has met with the cordial coöperation of the schools and of the friends of art in other cities. If it is followed, as will probably be the case, by similar classes for the study of other collections, the Metropolitan Museum will take a leading place among our places of higher education.

SOCIETIES

ARCHITECTURAL SKETCH-CLUB OF THE UNIVERSITY OF TENNESSEE.

THE Architectural Sketch-club of the University of Knoxville, Tennessee, is the title of an organization at that institution, organized one year ago for the purpose of creating an interest in the study of the art of all arts, architecture; and in the hope of influencing the Board of Trustees to establish a chair of architecture in the University.

The work designed for this year consists of drawing up specifications of various kinds and styles of buildings, making full working and detail drawings of same, making estimates on work, visiting buildings in process of construction, and several other features.

We also intend having a prize competition. Subject to be an "Academic Building for a University," prize to be a gold medal.

The prospects for the work of the club this year are very flattering, any suggestions, however, as to the best methods of conducting such an organization will be kindly received by either the President, W. L. Morgan, or J. B. Brown, Secretary.

SKETCH-CLUB OF NEW YORK.

THE regular October meeting of the club was held on Saturday the 7th inst. It was the first meeting in the new rooms, which are much larger than the old quarters and better adapted for serving dinners. Forty-five members sat down to dinner and over fifty were present during the evening. Mr. Richard M. Upjohn was the guest of the club and spoke of his recollection of the building of Trinity Church, of which his father was the architect. He also criticised the design for a gothic rose-window handed in at this meeting. There was an informal exhibition of summer work; forty-five sketches being hung on the walls. The regular winter classes of the club will begin this month. EDGAR A. JOSSELYN, *Recording Secretary.*

ILLUSTRATIONS

[*Contributors of drawings are requested to send also plans and a full and adequate description of the buildings, including a statement of cost.*]

THE HOTEL WALDORF, FIFTH AVE., NEW YORK, N. Y. MR. H. J. HARDENBERGH, ARCHITECT, NEW YORK, N. Y.

[Gelatine Print issued with the International and Imperial Editions only.]

HOUSE OF STANLEY MORTIMER, ESQ., ROSLYN, LONG ISLAND, N. Y. MR. JAMES BROWN LORD, ARCHITECT, NEW YORK, N. Y.

MARYLAND STATE PENITENTIARY, BALTIMORE, MD. MR. JACKSON C. GOTT, ARCHITECT, BALTIMORE, MD.

STORE AND APARTMENT BUILDING FOR THE BENNETT & PEAK HEATING CO., CINCINNATI, OHIO. MR. WILLIAM MARTIN AIKEN, ARCHITECT, CINCINNATI, OHIO.

PATERSON SAVINGS INSTITUTION, PATERSON, N. J. MR. CHARLES EDWARDS, ARCHITECT, PATERSON, N. J.

THE CHÂTEAU DE VITRÉ, FRANCE.

[Additional Illustrations in the International Edition.]

THE CATHEDRAL OF LAON, FRANCE.

[Copper-plate Etching.]

"ALTHOUGH the larger part of this building dates from the thirteenth century the greater antiquity of the *motif* of its design can be discovered by covering up the towers, whereupon the basilican character of the lower portion at once discloses itself. As M. Boussard says, "Some nameless miscreant, who could only have been a monkish architect, has plastered against the base of the west front the three porches intended to protect the faithful from inclement weather. The idea was well enough but what further excrescences have been countenanced by the absurd inspiration! The towers which crown this Roman basilica are needed as an offset to the pepper-pot Norman *tourelles* of the neighboring château and at the time served to remind the world that between the people and their feudal superior, in fact above them both, there was the clergy. In truth it was at Laon that the standard of revolt was first raised against Louis-le-Gros under the leadership of the clergy."

FOUNTAIN IN THE COURT OF THE PALAZZO VECCHIO, FLORENCE, ITALY.

[Copper-plate Etching.]

PREMISES: SOUTH AUDLEY STREET, W., LONDON, ENG. MESSRS. ERNEST GEORGE & PETO, ARCHITECTS.

MUNICIPAL TECHNICAL SCHOOL, BIRMINGHAM, ENG. MESSRS. ESSEX, NICOL & GOODMAN, ARCHITECTS.

THIS week we further illustrate the design selected by the Birmingham Corporation for this school.

The principal or ground floor is raised to admit light to the lower floors, and contains the rooms for the general and administrative department.

The lower ground-floor and basement are nearly all above the adjoining pavements; they contain the metallurgy and engineering departments, with the exception of the drawing and lecture class-rooms, which are on the upper floors; in the basement level a range of two and one story shopping contains the engines, dynamos, smithy and stamping shops.

On the first floor is the physics department, the rooms of the west wing being for experimental work and those in the east wing for electrical engineering and telegraphy, the centre being occupied by the physics and chemistry lecture-rooms and their preparation-rooms. The second floor contains the women's department and botany and geology class-rooms. The third floor contains the chemistry laboratories, with north light.

Lavatories for each separate department are placed on the north side of the corridors, separated from the rooms, lighted from the smaller areas. The main entrance is from Suffolk Street, and communicates with two well-lighted staircases connected by corridors on each floor; the central flight in entrance-hall leads to the ground and upper floors, whereas the side entrance gives access to the lower floors; separate entrances are provided in the lower ground and basement floors. The buildings will be of fireproof construction, having brick walls finished with buff terra-cotta dressings inside and outside; the outside facings will be red bricks and inside buff bricks, the assembly-hall and principal rooms being dadoed with oak and ceiled with ornamental plaster-work. The window-frames in the workshops and laboratories to be of specially-constructed fine cast-iron patterns and wrought-iron casements, and in the lecture class and other principal rooms deal casement frames with opening sashes, or sash and case with fanlight in the upper part, as most suitable to the apartment. The floors will be formed of breeze concrete filled-in between steel or iron flooring joists and girders. On the top of the main cornice, which has a width of three feet six inches, will be fixed a wrought-iron balcony-railing, with wrought-iron outside escape-ladders to pavement, and special exit-doors from upper floors to same. The staircases will be fireproof and of granolithic stone or slate slabs upon steel bar and latticed girder supports. The scheme for heating and ventilating adopted is by propelling air over calorifiers in the basement, the extract flues being connected with two upcast shafts. It is expected that building operations will be commenced early in October, and completed in time for the opening of the winter session of the school in 1894-95.

MUNICH. — AFTER A DRAWING BY SAMUEL PROUT.

COMMUNICATIONS.

[*The editors cannot pay attention to demands of correspondents who forget to give their names and addresses as guaranty of good faith; nor do they hold themselves responsible for opinions expressed by their correspondents.*]

ART SENSE AND ART NONSENSE.

BOSTON, October 3, 1893.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — In rejoiner to your comments on my last communication I will attempt to answer some of the questions which you have put to me; but, from the nature of the case it is difficult to give one's personal experience without offence. You ask, "How large a percentage of mill and industrial buildings have ever been entrusted to the care of such architects as have shown themselves competent to produce artistic results when equivalent sums of money have been entrusted to their handling."

I will mention three cases in my personal experience of which I can speak without hurting the feelings of any living person. In one instance in which it was desirable that a certain large factory building should appeal to the eye by its artistic proportion and construction, a professional architect, who, among all those that I have known, possessed more of the element of what we call "horse sense" than any other member of the profession then living, was entrusted to make the design under the general direction of an engineer. This was thirty years ago, and I was then in a subordinate position in connection with this factory and had not obtained my present experience in the profession of underwriting. The mill was constructed without consultation with the Factory Mutual underwriters until it was completed — the useful practice of consulting the underwriters prior to construction not having then come into vogue. When that mill was presented for insurance the necessary alterations to make it suitable to be insured on the mutual principle cost about ten thousand dollars and the roof story was permanently deprived of one-third of its value.

In a second instance, where I had occasion to put up a workshop under my own supervision, I procured plans from an architect, now deceased, to whom the general conditions of the problem were submitted. The result was the suggestion of a tower so incorporated in the building that it could not be treated separately and which by itself would have cost more than the entire building with a suitable tower afterwards cost.

The third case is very recent. An inventor possessing an unusual element of business capacity came here from a western city to build a workshop in which he might make special articles of metal that are consumed in greater measure in New England than they are in the West. He bought a piece of land in the neighborhood of Boston, having brought with him three sets of plans for his building made by professional architects. The previous owners of the land happened to advise him to come to me and he presented his three plans one after another for my consideration. I was obliged to condemn each one successively as being either unsuitable, unsafe or too costly. I then advised him to inspect a workshop that had been built in the manner corresponding to the enclosed drawing; which he did. He found it so exactly suited to his purpose that he borrowed the blue prints originally supplied from this office, by which that shop had been constructed, and he duplicated it with slight changes made on his own behalf. He then employed a skilful builder whom I named to him who was thoroughly familiar with mill construction and that shop is now a model workshop — one of many of this kind that have been built in all parts of the country.

I venture to suggest that you reproduce the picture of this workshop and put it as a problem to young architects to give it architectural effect — in place of the many customary problems, or supplementary thereto, which are given them in the course of their instruction, such as a "casino in a garden" or "a porch to a palatial dwelling," and other problems, as remote from American industrial life as can be conceived. Is it in the power of art to give a better or more satisfactory aspect to a workshop which must yet be in every respect consistent with the interior motive of the work for which this type of building is now constructed, corresponding to the picture sent herewith. If not, then the Philistine method must prevail.

I also enclose our No. 7 in section and plan. How shall they be clothed with our outer wall and tower of good effect without excess of cost? That would be another useful problem in æsthetic architecture.

Your second question is, "How many workmen having one thousand dollars to spend resort to architects for their designs as compared to those who go to the nearest carpenter?"

To this I reply, very few, if any. May there not be a good reason, not only for the workman who has a thousand dollars to spend, but for many well-to-do persons who may have a much larger sum to spend, being very cautious about adopting the plans for houses that are made for them by many architects without consulting the carpenter, lest their money should be exhausted long before the house should be finished? I have known some melancholy cases of

this kind even when architects of high repute had the sole control. In recent years I am assured there has been great improvement in this matter and that there are architects whose estimates can be depended upon, whose buildings are sometimes completed without a large bill of extras.

But is this a matter wholly resting with the individual workman? Are there not a great many instances of what may be called speculative operations entered into by people of large capital for the construction of small dwelling-houses in considerable number which shall attract tenants and buyers for adjacent lots? In how many of these instances have the small dwelling-houses, even when constructed by professional architects, been models of stability, safety, slow combustion, freedom from vermin, convenient, subject to very light repairs in long periods and yet built at a low or even lower cost (as they may be) than the ordinary examples? Are not these architects' houses usually of light framework covered-in with open boarding, single plastered, surmounted by crazy roofs enclosing attics which are ovens in summer, refrigerators in winter; the outside decorated mainly with the jig-saw? I am very confident that there is a field for the application of solid, slow-burning mill-construction, free of open spaces, warm in winter, cool in summer, in which an architect of repute could find constant employment for one department in his office that would much more than pay its way in planning and constructing workmen's dwellings of low cost. I know that this method of construction can be adopted at as low a cost as the ordinary examples of cheap dwelling-houses which I have cited — which are truly "cheap and *nasty*," such being the only combination of words by which they can be designated after they have been occupied by the ordinary workman's family for a short time, even in spite of the effort of the fourteen-hour wife who works arduously in a vain attempt to keep it in order, because their faulty construction forbids cleanliness.

I cannot answer the question whether the great artists whom you name designed industrial buildings or workmen's homes. The industrial building in its modern sense was unknown in their time. Had it not been, I believe that the motive of the industrial building working in their great minds would have enabled them to solve the æsthetic problem on that motive as surely as they have solved it on the motives on which they did work.

You remark that "if an architect is one who by *instinct* would produce a beautiful effect regardless of cost and excess of strength, and if an engineer is one who by *instinct* would produce a structure economical in cost, having no useless surplus of strength and absolutely disregardful of looks, they must perforce in these days of haste and complicated living be employed together to produce those fully satisfactory results which we desire."

I differ with you. Neither the *instinct* of the architect or engineer will accomplish either object. Both must be thoroughly trained in the drudgery of each profession and when each has developed the type of work to which his instinct may have given the first direction, but in which his thorough training finds its last expression, it may happen as in the days of old, that both functions may be found in the one man and he will then be the one architect worthy of the highest esteem. No man can be a true architect who is a mere artist in the conventional use of that word until the art instinct and the engineer's capacity are thus united in one. The work and the training of each must be combined in even proportion and of equal importance, to the end that the mere instinct of each may be rendered subordinate to the motive of the problem dealt with. When that is accomplished the right expression of that motive will be found in a structure that will be safe from the criticism of other artists and of other engineers. I have heard a great deal of talk about the "art sense," but I have seen many concrete expressions of what I can only name "art *non*-sense" in many modern buildings.

Your last remark is to the effect that the capitalist is "the most confirmed of gamblers" in dealing with construction. In this I take issue with you. The capitalists who construct factories, workshops and industrial buildings are as far removed from the type named by you as it is possible to conceive. Between them and the type of capitalists whom you have stigmatized there is a middle term. There are capitalists who furnish the means for constructing buildings in the city of which the lower stories are occupied for distribution, the upper stories for industrial purposes. They have shown their readiness to expend their money lavishly under the direction of professional architects for the purpose of giving æsthetic effect to the elevation, form and structure of the buildings. But I can cite to you many examples of this mixed type of buildings in which the upper stories which should have been replete with light, fresh air and opportunity for ventilation are dark and unwholesome, unfit to be crowded with working people as they are; because the architect who constructed them was one-sided — because he devoted his whole capacity to the æsthetic appearance on the street, to the sacrifice of utility, and at the risk of safety and wholesome conditions of those who are confined to their work in these upper stories.

I admit that there have been profound difficulties standing in the way of the professional architect, especially in the construction of city buildings of this mixed type; due to the necessity for extensive areas of glass in the lower stories which cannot be easily made artistically consistent with the customary methods of planning and constructing the upper stories. But it is evident that of late there are some architects who have succeeded in solving this problem and there are buildings in this city which can be readily designated, in which the lower stories have the abundance of light that is required and yet possess the elements of, as well as the appearance of strength and stability corresponding to the upper portions of the building, while the upper parts of some of these buildings have also been dealt with in due consideration to the purposes for which they are occupied.

Admitting this progress in city architecture, I might point out to you a few examples of factories built consistently with the rules of mill construction, and which are adapted in every manner to their use, in which the engineers have succeeded in dealing with the great mass, the fine proportion, the tower, the parapet and the pilaster in such a way as to give an air of repose, rest and of mass, of permanence and of stability to the whole work, and who have brought out some imposing effects consistently with the motive of the building, which I think would be admitted to be true and genuine by any true artist.

There is one class of buildings on which professional architects are customarily employed and in which the motive that governs the construction of the factory ought to be the most potent and in which ventilation and wholesome conditions should be most perfect. I refer to hospitals and asylums. I know of no class of buildings which were constructed earlier than about 1880, including very many recently built, which are on the whole of such ill repute on all these points of safety, stability and true hygienic method as this class. As a rule, they are surmounted by roofs of the worst possible type — they are pervaded by combustible cells in every direction — they have cost twice or thrice what they ought to at a true standard, and they can only be removed by the cremation of the buildings which is very apt to be accompanied by the cremation of many of the inmates. Only within a very short time have there been some conspicuous exceptions to this general condemnation, in hospital buildings which have been rightly constructed at a very moderate cost.

I would not have you impute to me a prejudice against architects or against the profession. On the contrary, I desire to see the profession raised to the high level of the opportunity which is waiting for its practice in buildings adapted to the motives of peace, order and industry. You must bear in mind that the very existence of the factories and the very life of my own profession must be governed by the motive on which these factories are constructed.

The policy by which we are, perforce guided, may be stated in these words: "Beware the methods of combustible architecture, and distrust all who are guilty of its practice — whether owners, builders or architects — whatever their respective shares in this evil method may be." Bear in mind that ninety-five per cent of the construction of this country comes under that condemnation.

The fault is mainly with owners, capitalists and investors, and yet not wholly. Are they so much to be blamed when he who may be called the "Chromo Architect" takes such a prominent position in the profession, imposing upon the ignorant his showy but sometimes picturesque elevations of sham construction in brick, stone or iron, behind which his own ignorance or incapacity in the art of building is concealed?

What is the origin of Combustible Architecture as it has been developed by the Chromo Architect? If I am not greatly in error, the fault lies deep in a false method of construction. If I am rightly informed, instruction in the École des Beaux-Arts begins with the art of design and ends with instruction in the principles of building, which may be complete, but is seldom followed to the end by American students.

Moreover, it begins and deals mainly with the Roman or Renaissance point-of-view, not with the simpler and truer Greek art. It may be held that the City, as an entity, originated with Rome, and that the development of the City is Roman, and not Greek; but the modern city differs from the ancient as much as the industrial motive of this country differs from the motive of conquest, or defence, or superstition, of which the Roman, the Ecclesiastical and the Renaissance styles were the outcome.

Whether we are right or not, we Philistines must continue to say: "'Ware the architects (I hope the editor will not impute any personal reflection) whose instruction begins with the designs of Greek temples, Roman porticos and Renaissance windows, and who has not completed a full course and taken a degree in the principles of construction, including the main elements of engineering."

Philistines like myself are the very ones who, like most of our school-committees and committees for the construction of hospitals and asylums, may be imposed upon by the Chromo Architect, and may be misled into a waste of money in unsuitable buildings, unless we keep our fire-eyes wide open and hold to our own Philistine method rather than submit to be misguided by false or meretricious art. Here endeth this chapter for the present. The Editor has the last card, and it may be the ace of trumps.

EDWARD ATKINSON.

P. S. Oct. 4th. On reviewing in my mind the communication which I sent to you yesterday, I think that even with the qualifying clauses at the end, the letter may have a hard and unsympathetic sound to the young architect who has hard work to get a living. I am fully aware of the grave difficulties which stand in the way of a young architect just entering upon his profession. In making any attempt to alter or change the customary type and style of buildings,

his work would be as profitless as my own in attempting to promote a revolution in the domestic kitchen and in the processes of cooking. Yet both undertakings must be followed to the end. The appetites of the mass of the people have been depraved by the American frying-pan and the propensity for hot biscuit, and it will take one or two generations to bring about a wholesome change in the habit of nutrition. In the same way, the demand upon the architect has been depraved by years of indulgence in crazy roofs and mustard-pot towers, profuse ornamentation and outside effects of the chromo style. In order to get a living, the architect who supplies this depraved taste, or rather, lack of taste and knowledge of what is needed, must meet it; he must attempt to guide his clients, rather than to set himself against them, else he may work his whole life without profit.

The remedy must begin with the foundation. The problems which I long endeavored to have put before the students in architecture while I was a Director of the Institute of Technology consisted of the questions with which I was called upon to deal myself. I would make the problems given out to students in every school of architecture, to the extent of one-half the number submitted, of a prosaic type. One would be the lay-out of an industrial town; choosing as a possible site a bit of unoccupied land somewhere in the neighborhood of the city with a stream running through it, corresponding to a site by a river where power might be generated, or by a landing-place for the fuel from which the power might be derived. To one pupil I would assign the lay-out of the land; to another the water-supply and drainage; to another the construction of the principal factory; to another the construction of the lesser workshops; to another the grocer's and other shops; to another the blocks of dwelling-houses; to another the separate dwellings; to others the Catholic and Protestant churches; to another the hospital, and to others the school-houses. Here you have the real problems of American industrial life, scarcely one of which has yet been taught or solved in the right way, so as to combine true art with utility and safety.

I may say that the practice of the architect on each and all of these problems is now empirical, taking little or no cognizance of the interior motives or their combination in such a village. I think you will admit that if such a problem were distributed among a certain number of the graduates of the schools of architecture of this country, chosen without discrimination at their graduation, the result would be wholly unsatisfactory. There would be no order, method or common design governing the whole; yet there are general and common and substantially uniform rules which might be applied to each and every one of these buildings, and which, if applied by men possessed with a comprehension of the American motive, would produce as harmonious a result, even without a consultation, as the Hellenic dream in Chicago, which will vanish, leaving little or nothing that can be applied to the construction of permanent buildings, or which, if applied, will be as much out of place as the Grecian portico executed in pine wood on the front of a country house.

Until some such course is taken, the young architect must cater to the present depraved demand, in supplying which he expects to get his living. The stream cannot rise higher than the source. School-committees, hospital-committees, even State-commissions, as well as the average owners who invest in buildings, will continue to be attracted by showy, plausible and well-executed designs and elevations, suitable or unsuitable as they may be to the purpose of the building. From such sources the architect must derive his income. All that can yet be expected of the young architect is to put good construction within these pictures in place of the very bad type of construction which is so common.

He can readily induce an owner to adopt solid and safe methods of timbering. He can persuade the owner not to sheathe brick walls with combustible woodwork varnished in such a way as to render complete destruction almost certain from a very small fire. He can persuade church-committees not to connect the hollow floor of the church by wooden flues with the peak of the roof. He can almost compel the dullest employer to adopt safer methods than are now so common, because if he comprehends his own business he can prove that the safe methods are cheaper and more truly attractive to tenants than the unsafe ones which are now so commonly practised.

I reminded you that you held the last trump, and you might play it on this chapter, ending the game; but I warn you that I have several trump-cards that I always hold in reserve in my sleeve for future deals. E. A.

[It is not the lack of cards, trump or otherwise, but of space that prevents our making a rejoinder to some of the points raised by Mr. Atkinson. — Eds. American Architect.]

NOTES AND CLIPPINGS

Compulsory Insurance of Laborers in Sweden. — The question of insurance of laborers has for quite a series of years attracted considerable attention in Sweden, where a Royal Commission was appointed in the year 1891 for the purpose of investigating the matter and the report of this committee is now completed. The principle of the proposal contained in this report is a compulsory insurance for the purpose of establishing a pension for every able-bodied man or woman who has completed the eighteenth year and who is employed by others for a remuneration not exceeding 1800 kr. (100*l.*) per annum. If the laborer begin to work for himself (or herself), or if he be out of employment, he no longer, for the time being, comes under the operation of the proposed Act. He is not only relieved from, but he loses his right to insurance, as the proposal does not acknowledge voluntary payments of premiums. He does not, however, forfeit the right to the pension which will ensue from the premiums already paid. The conditions for employment are, however, not very rigid, the fact of a person having been employed all the working days of a week by the same master sufficing. The weekly premium has to be paid every pay-day by the master, who himself defrays half the premium, the other half being deducted from the laborer's wages. This insures an annual pension of a fixed sum of 50 kr. (2*l.* 16*s.*) and a varying sum, which increases proportionately with the number of the weekly premiums paid; the pension becomes due when the insured has reached his seventieth year, or, if he, before that age, is incapacitated without any palpable negligence or intentional act on his part. At the death of the insured his legitimate children obtain each a yearly pension of 30 kr. (1*l.* 13*s.* 3*d.*) until they have reached the fifteenth year and the insurance also comprises the wives of married laborers, for whom no special premiums are paid, unless they themselves are so employed that insurance becomes compulsory. The widow of a laborer is, consequently, not entitled to a pension because she becomes a widow. The condition for obtaining this pension is a payment before the sixtieth year of 260 weekly premiums, unless the insured become incapacitated whilst in such employment that he is under the compulsory insurance. There are three classes, viz: 1. Male laborers earning 10 kr. (11*s.* 1*d.*) or more a week. 2. Male laborers not earning 10 kr. a week. 3. Female laborers and wives of male laborers. The weekly premiums of these three classes are respectively 50 öre (6 2-3*d.*), 30 öre (4*d.*) and 20 öre (2 2-3*d.*) and the variable pension rises respectively 10, 5 and 2 öre a year for each paid premium. If premiums have been paid the minimum time of five years, the annual pension will be respectively 76 kr. (4*l.* 4*s.*), 63 kr. (3*l.* 10*s.*) and 55 kr. (3*l.* 1*s.*); if the premiums have been the maximum number of years, viz, 52 years (from the 18th to the 70th year), the pensions for the three classes will be respectively 320 kr. (17*l.* 16*s.*), 185 kr. (10*l.* 6*s.*) and 104 kr. (5*l.* 16*s.*). The State pays with the municipalities all the expenses of administration, etc., and pays, at least for some time to come, 2 öre pension a year for each premium paid. — *Engineering.*

Suggested Annual Census of the Unemployed. — We spoke last week of the census of the unemployed in Chicago, which showed that 75,000 men in the skilled trades in the Western Metropolis are idle. A newspaper in Philadelphia has since made a similar count for its city, with results which show that some thirty thousand men are without work there. This latter enumeration, however, though it may be correct, will lack the authority, and, for the general public, the convincingness of the Chicago census, because the latter was taken by the city police in a systematic way. It seems to us that the officials of New York might with great advantage undertake, from time to time, similar enumerations. We saw how easily such work can be done when the municipality made its census to check or verify the federal count of New York's population. Statistics of this sort are not mere valueless figures. They give the business men of this country information as to the condition of industrial affairs which cannot be obtained in any other way, and which would be as valuable to manufacturers, merchants and artisans as clearing-house statements or reports of the condition of the Treasury at Washington. In times like the present they would be of special significance. Indeed we venture to say there are no figures that have appeared lately *apropos* of the industrial depression which have been of as much account as the Chicago figures of the unemployed and the similar figures concerning Philadelphia. — *Record and Guide.*

The T-girders used by the Romans. — In discussing the use of iron on a large scale by the Romans, Mr. Gardner writes: "From Pompeii we might infer the total absence of constructive ironwork in Roman architecture, yet Professor Aitchison claims that in the Baths of Caracalla a large ceiling was supported on iron girders." This fact might be stated less doubtfully than these words would imply, since some tons of broken iron T-girders were found a few years ago during the excavation of the great cella soliaris of the Thermæ of Caracalla. These girders had been cased in bronze, and they were arranged so as to form square panels, which were filled-in with concrete decorated with mosaic and delicate stucco reliefs, all colored and gilt, thus forming a strong and richly-decorated flat ceiling, with a span of enormous width. — *The Saturday Review.*

The Value of Hands and Fingers. — The comparative value of the hands and fingers have been estimated in a scale supplied by the Miners' Unions and Miners' Insurance Companies, of Germany. The loss of both hands is reckoned as a depreciation in working capacity of 100 per cent; of the right hand 70 to 80 per cent; left hand, 60 to 70 per cent; thumb, 20 to 30 per cent; right forefinger, 14 to 18 per cent; left forefinger, 8 to 13.5 per cent; third finger, the least in value, 7 to 9 per cent; little finger, 9 to 12 per cent. The range in percentages is due to the differences in occupations. — *Invention.*

The Durability of Indian Timber. — Since 1881 the durability of thirty-nine different Indian timbers has been under test at the Forest School in Dehra. Perpendicular posts, half under ground, were used, and one by one the softer and weaker woods disappeared, under the attack of rot and white ants, until a short time ago only three of the timbers remained sound. These were Himalayan cypress, teak and anjan, which had been exposed ten, nine and seven years respectively. — *Invention.*

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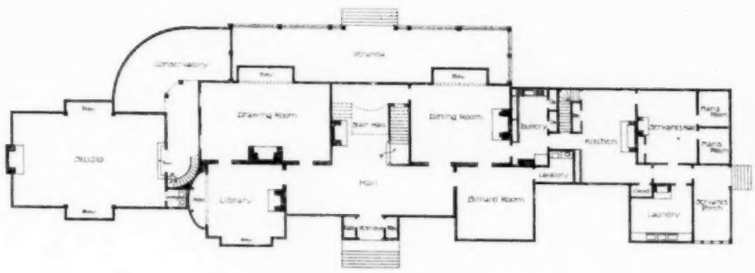

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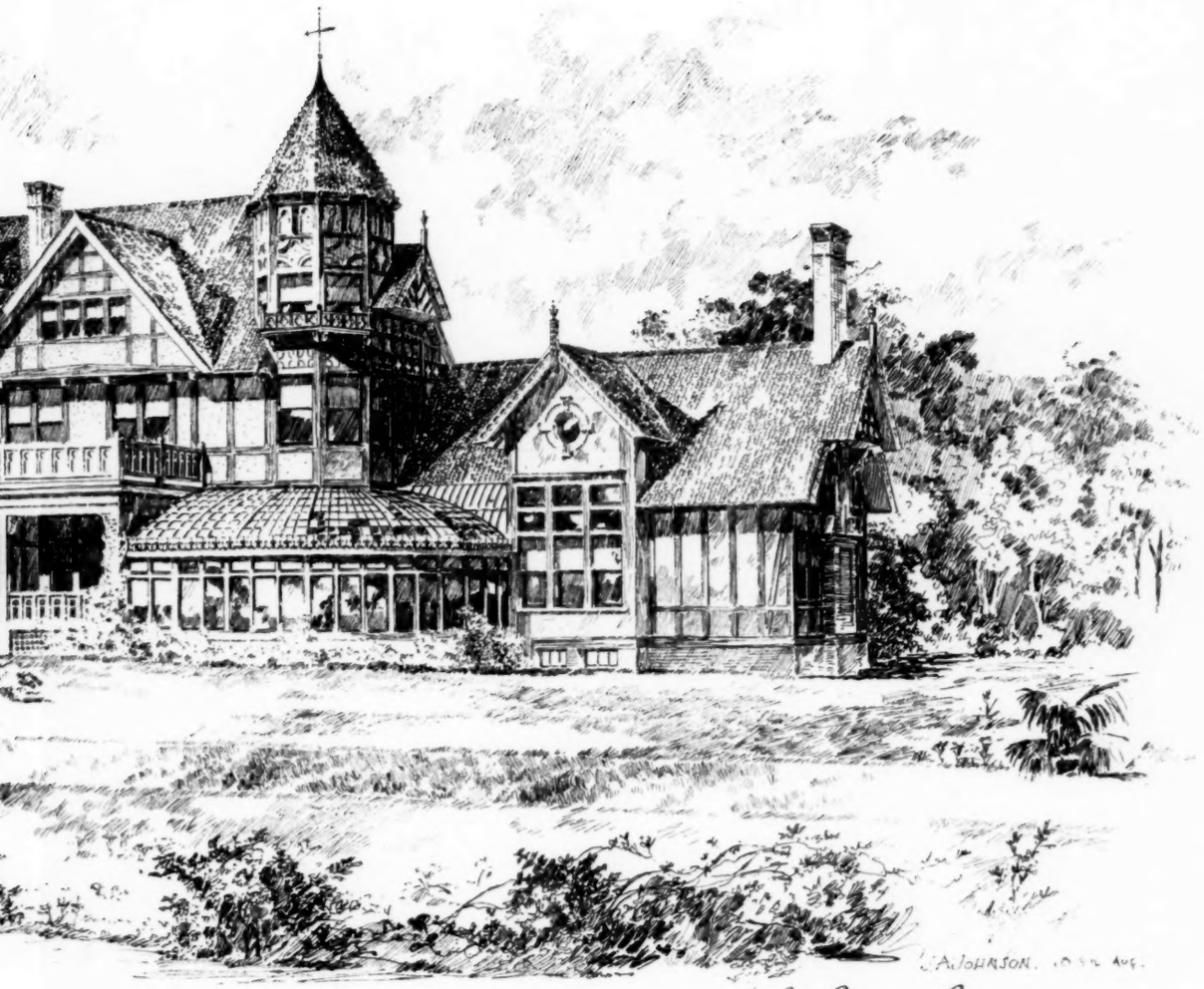

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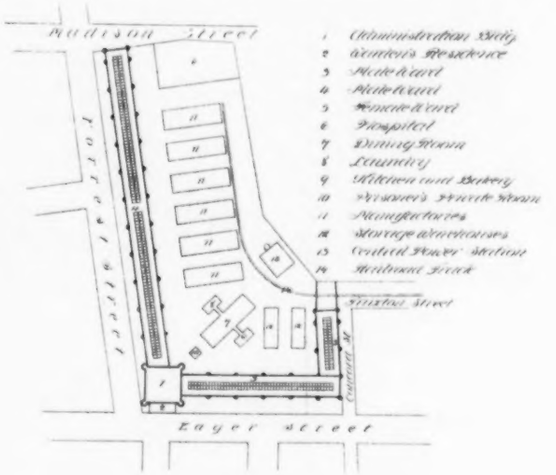

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